ELECTRICAL CONSTRUCTION AND MAINTENANCE

MAY • 1949

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A McGRAW-HILL PUBLICATION

when you're buying fluorescent fixtures

You're on the right track to better lighting when you see this tag on a fluorescent fixture. It means the manufacturer has made use of the industry's finest ballast to assure you of rated lamp life and light output . . . with quiet operation and a minimum of maintenance.

General Electric ballasts are designed, built and tested to get the most out of all standard fluorescent lamps. So for quality and economy in fluorescent lighting, insist on this tag when you're making a purchase—and get the most for your money. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

FLUORESCENT LAMPS, unlike incandescent lamps, do not draw current directly from the lighting circuit. Instead they draw their current through a special transformer or ballast mounted in the fluorescent fixture.

With fluorescent lighting, therefore, the amount of the light you get from the lamp, the life of the lamp, and to some extent the life and efficiency of the fixture itself, depend in large measure on the characteristics of the ballast. Good ballasts mean better lighting.

GENERAL ELECTRIC

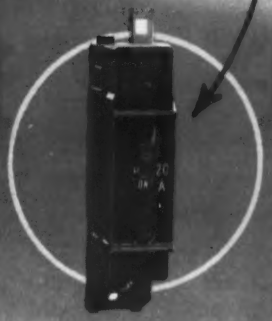
412-72

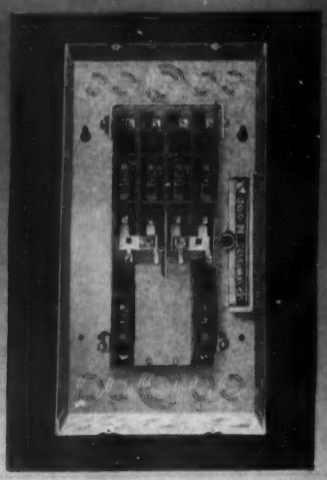
Murray
MODERN METHODS *mean Highest Quality . . . Latest Design . . . Greatest Value!*

8 Circuits *in* 1 Load Center

With the World's Most Satisfactory Overload Protection:

Murray FULLY MAGNETIC Circuit Breakers





Now you can anticipate two of tomorrow's needs today: (1) more circuits, (2) better protection against overloads. Both requirements are met in the NEW Murray 8 Circuit Magnetic Breaker Load Center!

This modern new equipment brings you the latest in satisfactory overload protection — at moderate cost. As few as four breakers need be installed with the panel . . . more can be added as circuits are added! Any *individual* breaker can be interchanged with a breaker of different rating — making possible unlimited combinations, right on the job . . . and the only tool needed is a screwdriver!

In addition, each Murray *Fully Magnetic* Circuit Breaker is virtually an electrical engineer at the switch! Just see what it does: It carries full rated load indefinitely — *no derating necessary.* It accommodates heavy momentary overloads — even when carrying full rated current. Yet it trips reliably, in a reasonable time, under sustained overloads. It interrupts the circuit almost instantaneously under "short circuit" conditions. *And because it has no thermal element, it is virtually unaffected by ambient temperature changes!*

Yes, you can equip today for the loads of tomorrow — and for tomorrow's exacting standards of overload protection—with the NEW Murray 8 Circuit Magnetic Breaker Load Center. For full details, contact your Murray representative, or write

Eight branch circuits are controlled and protected by this NEW Murray Magnetic Circuit Breaker Load Center. Utmost flexibility is achieved by *individually interchangeable* single pole breakers rated at 10 to 50 amp. Range Circuits can be accommodated by 35 or 50 amp. circuit breakers. Surface or flush mounting.

Murray MANUFACTURING CORPORATION

50 Years of Service to the Electrical Industry

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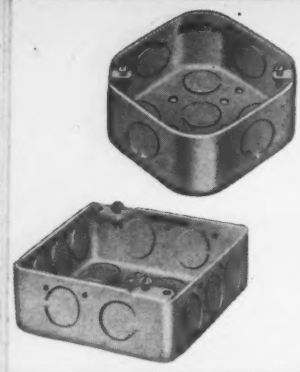
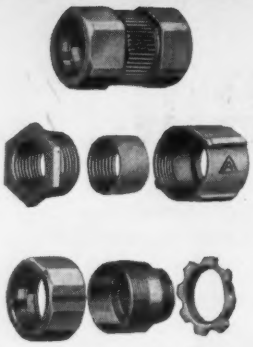
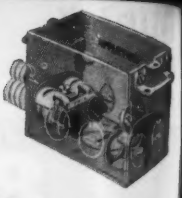
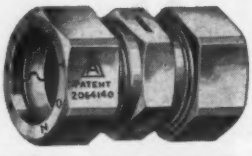
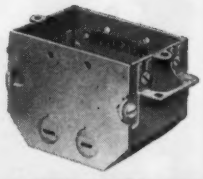
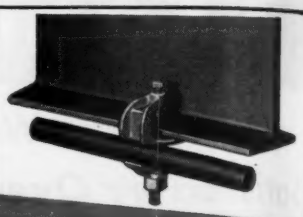
FOR TOMORROW'S LOADS . . .

Equip Today!

SERVICE ENTRANCE & METER EQUIPMENT • MAGNETIC CIRCUIT BREAKERS
SWITCHES • CURRENT LIMITING REACTORS



Everything you need in electrical fittings

Make Appleton your source for electrical fittings and be sure of the best. In the expertly engineered Appleton line there's a fitting for every turn and terminal—every requirement for every modern wiring job.

Outlet and switch boxes, clamps, couplings, connectors, panel boards, entrance fittings—whatever fitting your remodeling or building plans call for can be conveniently ordered from any one of the hundreds of electrical wholesalers who feature the Appleton line.

Products of Appleton's own foundries and fabricating plants, Appleton fittings are ruggedly made to last for the life of the building. All are of the same uncompromising high quality. All are STANDARD FOR BETTER WIRING. Write for complete catalog information.

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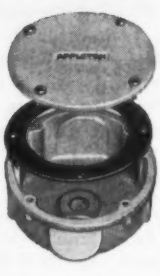
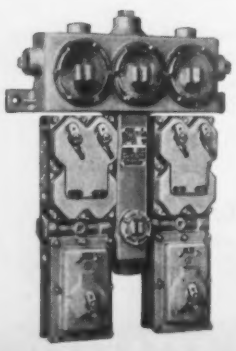

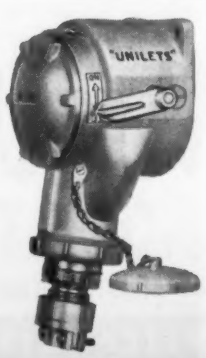

ELECTRICAL CONSTRUCTION AND MAINTENANCE

With which is consolidated Electrical Contracting, The Electrologist and Electrical Record . . . Established 1901

A practical technical and management journal for electrical contractors, industrial electricians, inspectors, engineers and motor shops, covering engineering installations, repairing, maintenance and management, in the field of electrical construction and maintenance.

May • 1949

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As a contractor, I hear the complaints when fixtures prove unsatisfactory. I can't afford repeated customer gripes, so I handle only fixtures that are equipped with Certified Ballasts.

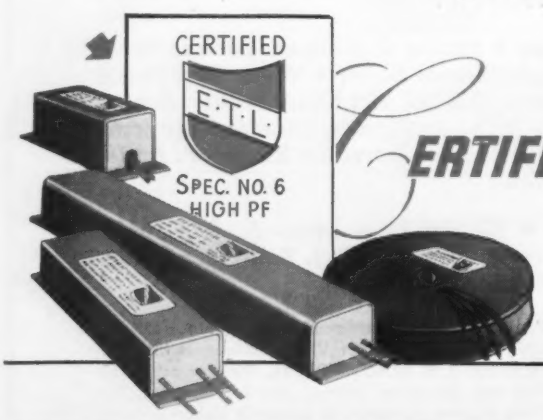
They assure me—

Full lamp life — **Quiet operation**

Rated light output — **Reliable performance**

Certified Ballasts are made to rigid specifications—then tested and checked by impartial Electrical Testing Laboratories, Inc. That's why they're really reliable.

By insisting on Certified Ballasts I keep service worries to a minimum and keep my customers happy.



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Makers of Certified Ballasts for Fluorescent Lighting

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General Electric Portable Instruments

for easy, accurate measurements in your plant or laboratory . . .

AK-1 HOOK-ON VOLT-AMMETER *FOR REGULAR PREVENTIVE MAINTENANCE*

Prevent costly shutdowns by using this handy testing instrument for regular periodic checks of your motor, wiring and transformer loads. It will also help you be sure you are getting efficient operation of your equipment—no loafers.

EASY TO OPERATE—Split-core transformer permits you to make alternating-current measurements without cutting conductors. Just hook it over conductor (any size up to 2 inches), and flip selector switch to desired range (0-15/60/150/500 amps). It's as easy as that. A-c voltage measurements (0-150/600) are easily made by connecting leads to voltage binding posts. One hand operation of selector switch permits quick change from one range to another.

You can get this handy testing instrument from your nearest distributor. If you want more details, write for Bulletin GEA-2950.*

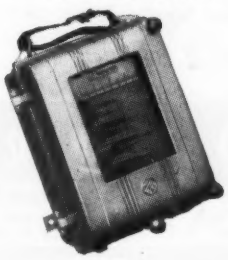
AP-9 INSTRUMENTS—*EFFICIENT ELEMENTS AND STURDY CASES*

These instruments are designed for general testing and are constructed for rough usage. Yet, they have high initial and sustained accuracy which is obtained by lightweight moving element, a magnetic shield, high torque, and large clearances.

The main vane is made of a metal characterized by exceptionally low hysteresis losses, which results in accurate performance under such conditions as varying frequency, distorted wave form, and direct current.

The AP-9 instruments come in attractive durable Textolite cases as a-c voltmeters, ammeters, milliammeters, wattmeters, and volt-wattmeters in a variety of ratings. Complete line of d-c instruments (Type DP-9) also available. They're all described in Bulletin GEA-1784. Write for your copy today.*

TYPE CF INKLESS RECORDERS—*DEPENDABLE AND ACCURATE*



Easy to operate and inexpensive to maintain. They provide continuous chart operation for thirty days without attention. The electric mechanisms are high-grade indicating instruments with effective magnetic damping. The record is made by means of a typewriter ribbon and striker bar. Therefore, unlike the direct inking recorder, the mechanisms are not required to move a heavy inking pointer across the surface of the chart. This means low power consumption and low burden on instrument transformers. In addition, there is no pen to clog, no ink to spill, and no drying problem where humidity is high.

Your voltage surveys and circuit load checks will be made easier with CF recorders. They're available for a-c or d-c, indoor or outdoor, portable or switchboard use in many models and ratings, all described in Bulletin GEC-215. Write for your copy today.

Apparatus Department, General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

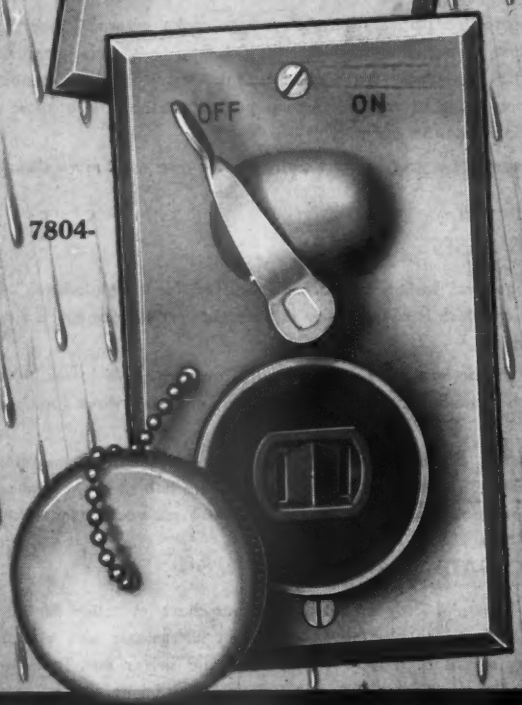
602-153

H & H WEATHERPROOF

SWITCHES AND RECEPTACLES

-7868

7869



7804-

Receptacles Nos. 7868 and 7869 have lids that close automatically when plug is withdrawn... Added feature for *weather protection* because receptacle cannot carelessly be left open. Each device in the H & H Weatherproof Line has sprayed aluminum finish on brass plate (complete with weatherproof mat), for installation in standard one-gang switch box. Receptacle rating: 15 A., 125 V.; 10 A., 250 V. Switch rating: 10 A., 125 V.; 5 A., 250 V.

Illustrated at left No. 7804, — compact one-gang weatherproof unit, combination of T-rated switch and parallel-slot double-sided contact receptacle. May be wired for switch control of light or receptacle... These weatherproof units are specially adapted to garages, workshops, filling stations, loading platforms, breweries, creameries, barns; farm, store and residence outdoor lighting.

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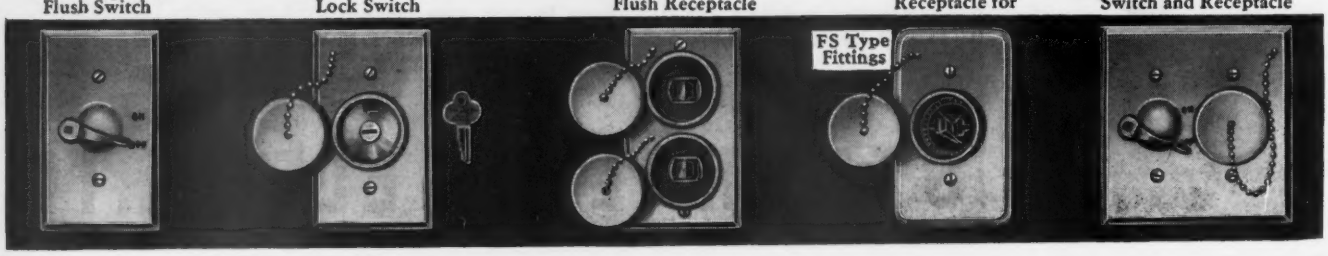
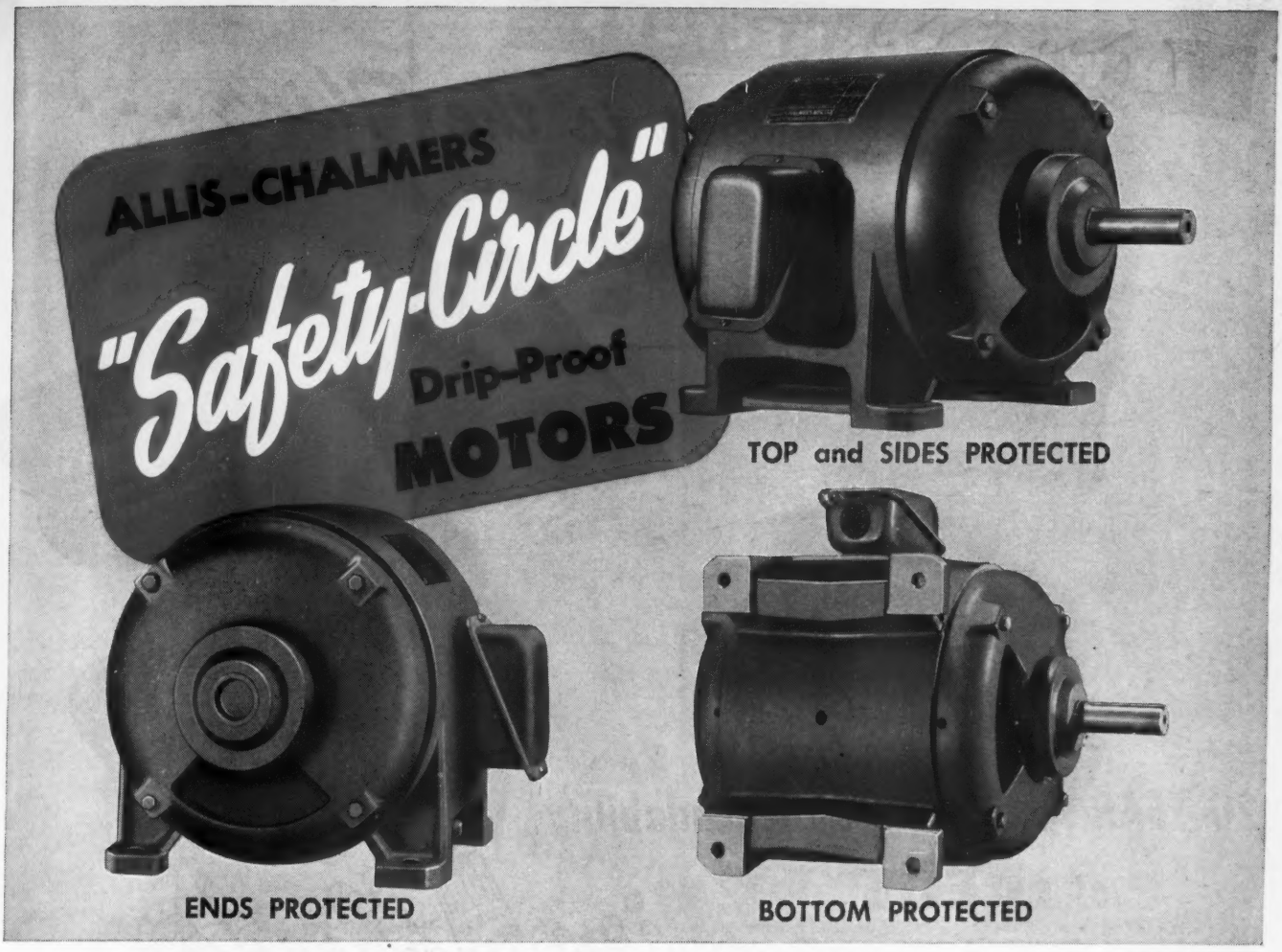
THE ARROW-HART & HEGEMAN ELECTRIC COMPANY, HARTFORD 6, CONN., U.S.A.

7981	1281-WP	7890	7792-FS	7886
Weatherproof Flush Switch	Weatherproof Lock Switch	Weatherproof Duplex Flush Receptacle	Weatherproof Flush Receptacle for	Weatherproof Flush Switch and Receptacle





Get All-Around Motor Protection with

SAFETY-CIRCLE

THAT SOLID CAST IRON FRAME protects SAFETY-CIRCLE working parts against physical damage from every angle. The completely enclosed bottom provides extra protection and extra strength. End brackets are drip-proof at no premium.

Because the frame is cast iron, it is resistant to rust and corrosion. It withstands physical abuse and will not distort.

Protected Inside, Too

SAFETY-CIRCLE protects against internal breakdown with multiple-dipped and baked stator and die-cast aluminum rotor. *Ball bearings are factory-lubricated and need no attention for years.* Wide open internal construction and large fans keep temperatures well within rated limits.

Don't be satisfied with a motor that gives you less than full protection. Insist on the extra protection of SAFETY-CIRCLE.

For complete details on SAFETY-CIRCLE advantages, see your A-C Authorized Dealer, Sales Office, or write for Bulletin 51B6210B. Sizes from 1 to 20 hp, 326 frames and smaller. Safety-Circle, Texrope and Vari-Pitch are Allis-Chalmers trademarks.

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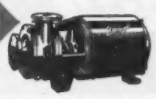
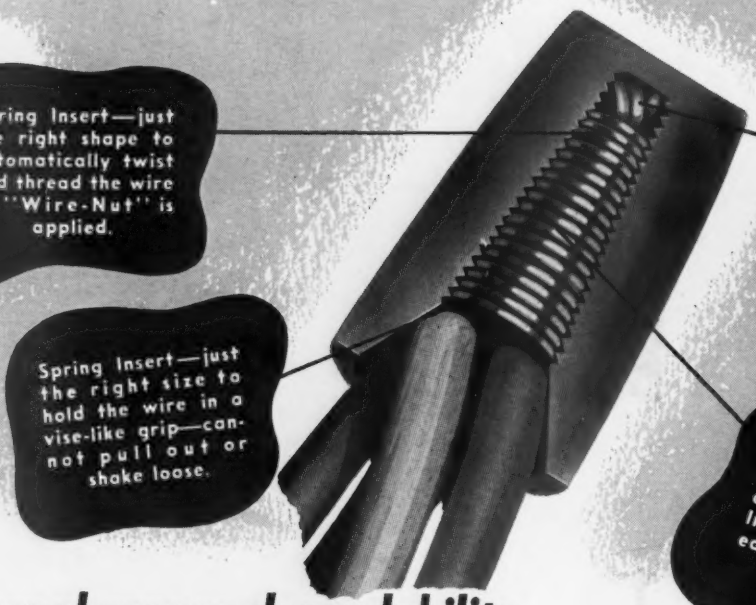
TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.



PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

IN WIRE CONNECTORS

The Spring is the Thing . . .


Spring Insert—just the right shape to automatically twist and thread the wire as "Wire-Nut" is applied.
Spring Insert—just the right size to hold the wire in a vise-like grip—cannot pull out or shake loose.
Spring Insert—just the right length to permit ample clearance in Connector for wire ends.
Spring Insert—manufactured to close tolerances. Inspected and tested with laboratory care.

20-YEAR record proves dependability of IDEAL Wire-Nuts®

(Patent No. 1,933,555)

THE SOLDERLESS, TAPELESS WIRE CONNECTOR

Springs, like twins, may look alike, but scientifically there is a difference. In Connector springs the difference is in the shape of the cone, size of wire, length of the coil, and the accuracy to which these design specifications are held in manufacture. All four are combined in "Wire-Nuts" in just the right combination to give you a wire joint that is permanent, one that can't *pull out* or shake out.

The superiority of the IDEAL "Wire-Nut" spring is the result of 20 years' experience in the design, manufacture and application of wire connectors. Continued superiority is assured by close manufacturing control and rigid inspection.

For example the IDEAL spring insert is tested for wire diameter, dynamometer-tested for tensile strength. It is precision wound into the proper conical shape, and sample-checked for accuracy on a 40-to-1 comparator to .001″ tolerance.

This is only one of the nine different inspections that assure you that you always have the best when you use IDEAL "Wire-Nuts". Add the fact that there is no easier way to make approved wire joints and you have the reason why "Wire-Nuts" are preferred over all others for cutting wiring costs — millions in use!

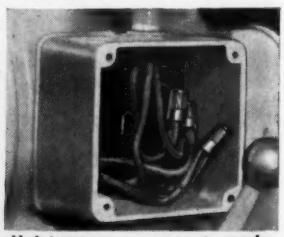
Listed by Underwriters' Laboratories, Inc., and approved by other leading electrical authorities.

For all Circuit and Fixture Wiring using wire combinations from 2 No. 10 up to 3 No. 18, solid and/or stranded.

SCREWS ON--like a nut on a bolt
No solder, tape or tools

Circuit wiring with "Wire-Nuts" is simple because there are no tools to handle.

Industrial Wiring — Two "Wire-Nuts" support entire weight of fixture. Joint is strong, permanent.



Maintenance — easy to make changes. "Wire-Nuts" can be unscrewed and screwed on again.

Distributed Through America's Leading Wholesalers

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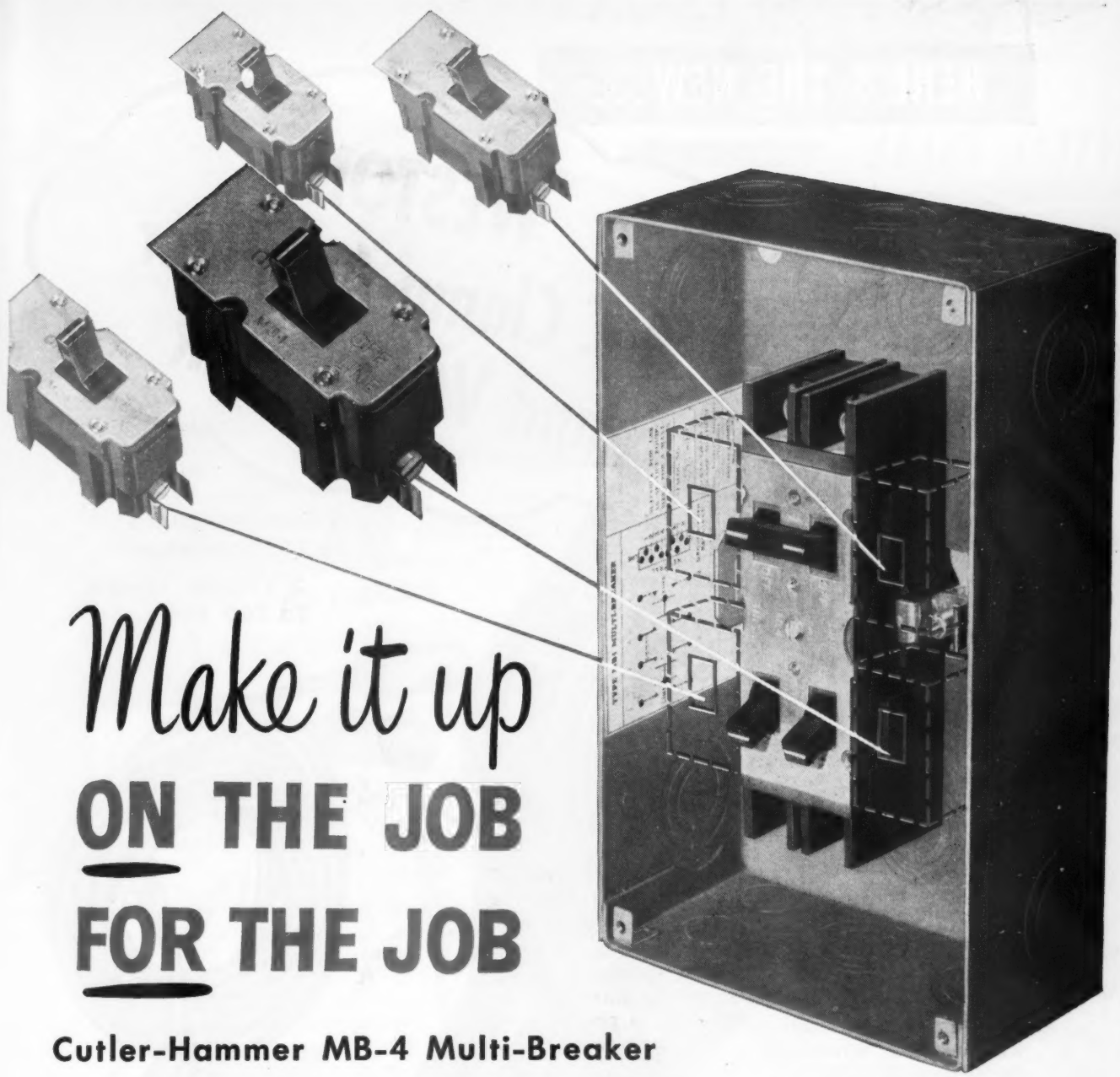
IDEAL INDUSTRIES, Inc. Sycamore, Illinois



Make it up
ON THE JOB
FOR THE JOB

Cutler-Hammer MB-4 Multi-Breaker with the Easy-Add-On Units Meets Every Need

The Cutler-Hammer Type MB-4 Multi-Breaker is an achievement that offers important advantages to the contractor and to the wholesaler.

In appearance and construction the Cutler-Hammer MB-4 is *unlike* any previous Multi-Breaker. In this *new* MB-4 Multi-Breaker, to a basic 4-pole unit, additional single-pole Multi-Breaker units can be added at any time simply with the aid of a screwdriver.

Now the contractor can make up just the Multi-Breaker he needs *on* the job *for* the job. To the fundamental unit he simply adds from one to four "add-on" units as the number of circuits and their capacities dictate. Further, any of the "add-on" units can be changed on the job AFTER the complete Multi-Breaker is installed if the circuit requirements change; just a simple change, not a major operation. No delay. No trouble.

With the C-H Type MB-4 Multi-Breaker, the wholesaler can offer maximum service with minimum stocks, minimum investment, minimum inventory. He can furnish *exactly* the Multi-Breaker needed for *each* job without maintaining a large and complex assortment of complete Multi-Breakers incorporating the many combinations of breakers possible.

CUTLER-HAMMER
MULTI-BREAKER
C-H

The Cutler-Hammer MB-4 provides Thermal-Magnetic trip for lag on harmless overloads but *instant* trip on short circuits. *Electronically* calibrated like all Cutler-Hammer Multi-Breakers for dependable performance. 70 ampere mains for small homes. 100 ampere mains for large homes. Breakers from 15 to 50 amperes. Underwriters' approved. Available in flush or surface mounting. CUTLER-HAMMER, Inc., 1306 St. Paul Ave., Milwaukee 1, Wis.

HERE'S THE NEW...

WESTON A-C Clamp-Ammeter and VOLTMETER

5 Current ranges to 1000 Amperes

3 Voltage ranges to 700 Volts

Voltage terminals recessed, with insulated screw-type connectors on leads.

Heavily insulated jaws accommodate conductors to 2" dia. (bare or insulated).

Pointer stop for indicating motor starting currents.

Trigger operation for convenience.

Ask your Weston representative for full particulars, or write . . . WESTON Electrical Instrument Corp., 617 Frelinghuysen Ave., Newark 5, N. J.

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Leader LEADS AGAIN!

The louvered type fixtures, as illustrated above, feature molded plastic louvers and plastic side panels. The plastic has been de-staticized to prevent electrostatic attraction, and will not warp or discolor. The New Horizon model is available in 2-lamp style, NHC-280-F; 3-lamp style, NHC-380-F; and 4-lamp style, NHC-480-F. The open-type fixture comes in 2-lamp style, NHO-280-F; 3-lamp style, NHO-380-F; and 4-lamp style NHO-480-F.

● Now LEADER engineers offer the NEW HORIZON Fluorescent Fixture jam-packed with light—brilliance without precedent! . . . Larger diameter lamps, of 425 milliamperes, achieve a new high in intense illumination without any increase in surface brilliance.

When you seek the best in fixtures—choose LEADER . . . When you want the latest in lighting progress—choose LEADER . . . When you are looking for the most for your dollars—choose LEADER! LEADER Fluorescent Fixtures—sold and installed only by the better electrical wholesalers and contractors.

Send for mechanical details—today!

LEADER ELECTRIC COMPANY

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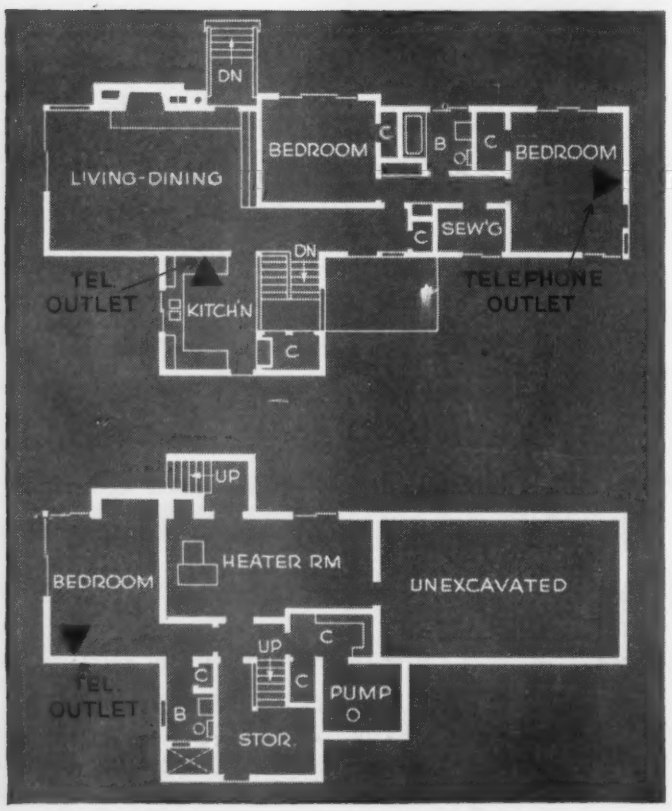
WEST COAST FACTORY • 2040 LIVINGSTON • OAKLAND 6, CALIFORNIA

Perkins & Will and Edwin H. Mittelbusher, Architects

TELEPHONE RACEWAYS
FIT INTO THE SCHEME OF THINGS



Most new homes today are a blend of beauty and utility—everything in its proper place. And the proper place for telephone wires is out of sight.

Telephone raceways, installed during construction, will keep them from being exposed on walls and woodwork. And they mean another source of profit for you.

Remember—NO ELECTRICAL CONTRACT IS REALLY COMPLETE UNLESS IT CONTAINS RACEWAYS FOR TELEPHONE WIRES.

BELL TELEPHONE SYSTEM

Midget EVER-LOK

PLUGS, RECEPTACLES AND CORD CONNECTOR

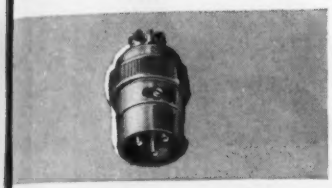
FOR COMMERCIAL AND INDUSTRIAL APPLICATION

10 AMPERES, 250 VOLTS — 15 AMPERES, 125 VOLTS — A. C. OR D. C.

Available in various combinations to meet specific requirements.

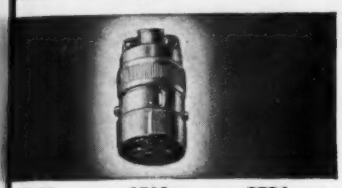
CATALOG NUMBERS

2 Wire 2 Pole	2 Wire 3 Pole	3 Wire 4 Pole



8712 8713 8714

Male plug interior in steel enclosure, cadmium plated finish. Complete with sponge rubber dust-tight bushing and cable grip. Maximum cable diameter ½ inch. Appr. net weight ¼ lb.

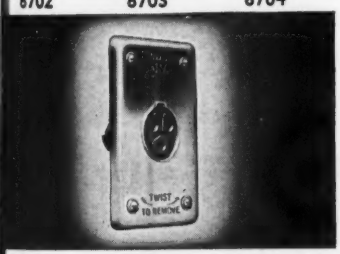


8722 8723 8724

Female connector interior in steel enclosure, cadmium plated finish. Complete with sponge rubber dust-tight bushing and cable grip. Maximum cable diameter ½ inch. Appr. net weight ¼ lb.

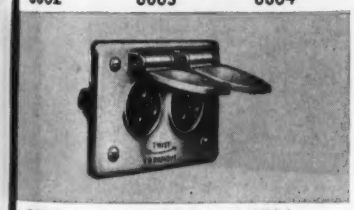
8702 8703 8704

Single receptacle complete with heavy gage steel cover with gasketed flap, cadmium plated finish. Fits types FS and FD conduit boxes. Appr. net weight ½ lb.



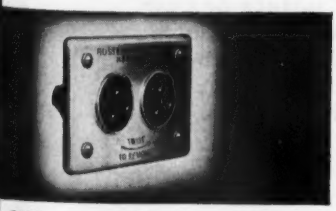
8802 8803 8804

Single receptacle complete with heavy gage steel cover without flap, cadmium plated finish. Fits types FS and FD conduit boxes. Appr. net weight ⅜ lb.



8732 8733 8734

Duplex receptacle complete with heavy gage steel cover with gasketed flaps, cadmium plated finish. Fits types FS and FD conduit boxes. Appr. net weight ⅝ lb.

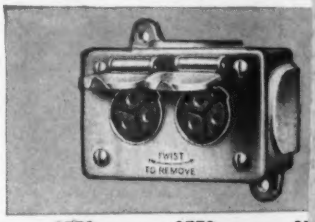


8832 8833 8834

Duplex receptacle complete with heavy gage steel cover without flaps, cadmium plated finish. Fits types FS and FD conduit boxes. Appr. net weight ½ lb.

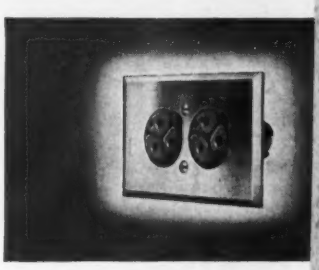
CATALOG NUMBERS

2 Wire 2 Pole	2 Wire 3 Pole	3 Wi 4 Pol



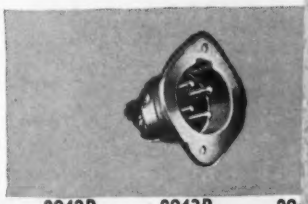
8772 8773 8

Duplex receptacle complete with heavy gage steel cover with gasketed flaps, cadmium plated finish, and type FS single gang cast iron conduit box. Appr. net weight 3⅝ lbs.



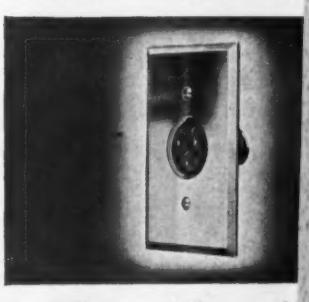
8862 8863 88

Duplex receptacle complete with .060 inch brass flush plate without flaps, brush brass finish. Fits standard 4 inch outlet boxes with raised covers. Appr. net weight ½ lb.



8942R 8943R 89

Single male receptacle interior in flanged steel casing, cadmium plated finish. Appr. net weight ⅛ lb.



8842 8843 8

Single receptacle complete with .060 inch brass flush plate without flap, brush brass finish. Fits standard 4 inch outlet boxes with raised covers, or single gang switch boxes having 2 inch minimum depth. Appr. net weight ⅜ lb.

8792 8793 8

Single receptacle complete with cast aluminum conduit fitting and cover with gasketed flap, corrosion resisting finish. Tapped for ½ inch conduit, one way only. Appr. net weight ⅝ lb.

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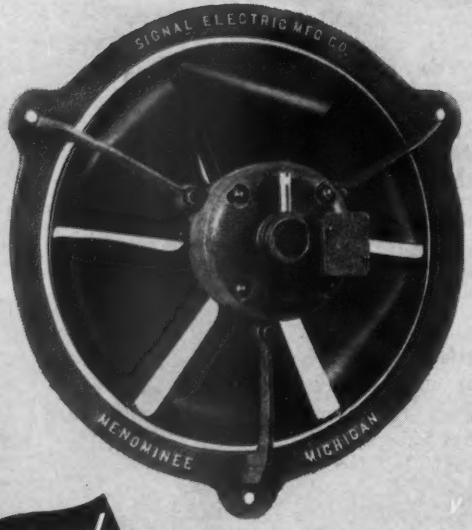
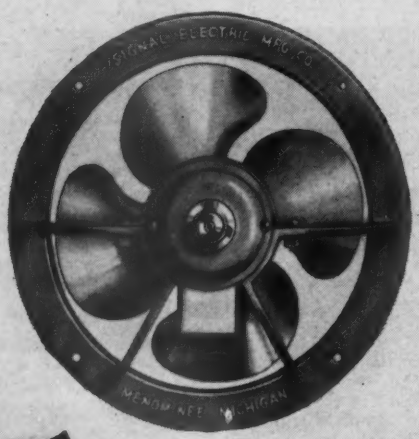
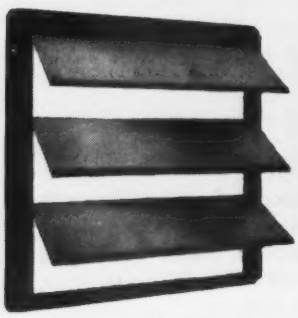


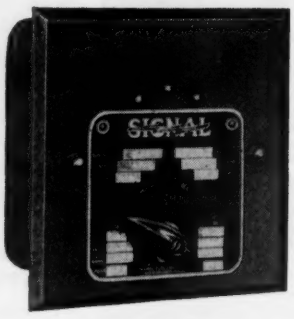
MODEL V-316 BUCKET BLADE EXHAUST FAN — Available in 12", 16", 18" or 24" sizes. Fan operates in either horizontal or vertical position, fan end of motor up or down.



MODEL V-105 — Weight only 8 lbs., the ideal unit for installations where weight is an important factor. Can be mounted on materials as light as wallboard. 10" quiet type fan delivers 600 C.F.M.



AUTOMATIC SHUTTERS — Provide weather-proof protection for all *Signal* Exhaust and Vent Fans. Vanes operate in unison, open automatically when fan is started, close when fan is stopped.



3-SPEED CONTROLLERS — Either surface or flush type mountings available; for use with *Signal* Bucket Blade Exhaust Fans and Flat Blade Vent Fans.

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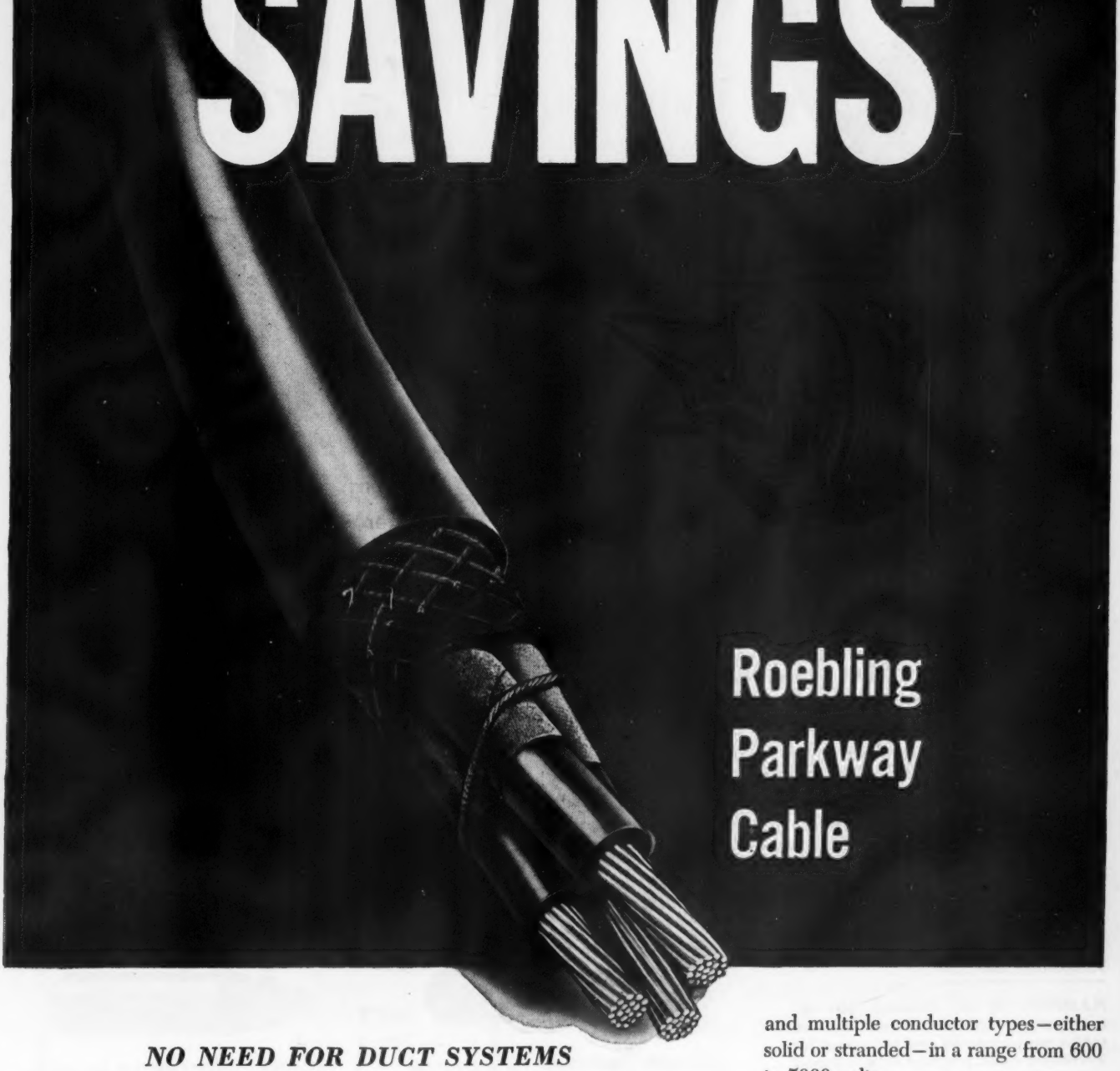
Dept. C-3 • Menominee, Michigan

JR ROEBLING

CUT OVERHEAD . . . GO UNDERGROUND FOR

SAVINGS



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ROEBLING PARKWAY CABLE is laid directly in the ground. No complicated and costly duct systems . . . a trench only two or three feet deep is ample and economical. Once installed, you can count on Roebling Parkway for trouble-free and uninterrupted service.

You have the choice of Roebling Parkway Cable with metallic armor or with a non-metallic, roeprene sheath that affords dependable physical protection. Both can be supplied in single and multiple conductor types—either solid or stranded—in a range from 600 to 5000 volts.

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FLAMENOL—in all standard 600-volt constructions—is one of six modern cables mass-produced and authorized for warehouse stock. Standard designs permit quicker delivery and a lower price than special types. Each offers advantages in its recommended applications.

CORONOL®-GEOPRENE For high-voltage power distribution. Has superior resistance to heat, corona, and aging. Bulletins GEA-1788, GEA-4848.

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GEOPRENE CONTROL For connection between control panels and portable push-button stations on large machines. Resists rough handling and repeated flexing.

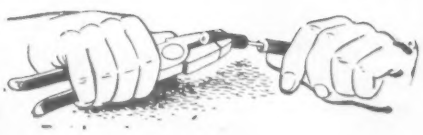
. . . stand up under cutting oils ?

Chemically inert G-E Flamenol® cable safeguards your low-voltage plant circuits against oils, cutting fluids, acids and alkalies.

. . . cut down fire hazards ?

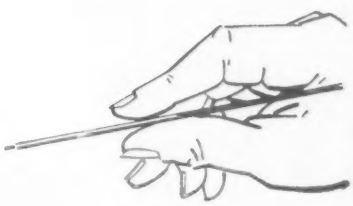
Flameproof Flamenol cable can't spread a fire, because it won't support combustion.

. . . save installation time ?



Flamenol cable strips cleanly to simplify terminating, and its hard, sleek finish makes pulling through raceways easy.

. . . fit in small space ?



With no added covering needed, Flamenol cable's smaller diameter saves space, makes for neater wiring.

It will if it's

Flamenol Cable

made only by General Electric

Wherever your plant wiring calls for low-voltage cable that's long-lasting under conditions as tough as they come—that's the place for G-E Flamenol cable. Thermoplastic-insulated Flamenol cable, made by General Electric, is completely controlled in the making, from raw material to finished product. That's why you get the uniform quality that assures greatest service reliability. For more information, write for Bulletin GEA-4352, or call your nearest G-E office. Section W27-518, Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

GENERAL ELECTRIC

THE ONE BELL that meets every installation condition . . .

Whatever your requirements in a bell system, certain standards of tone, signal strength, mechanical dependability, installation factors, obviously determine your choice. Check the following features of the new Edwards Adaptabel—and see how faithfully they reflect the most critical requirements:

1. LOUDER & CLEARER.
Adaptabel's tone is pure and penetrating—easily heard above all clamor. Size for size, it's far louder than any bell now made. In fact, the 6" Adaptabel is more powerful than most 10" old-style bells!

2. FITS ALL MOUNTINGS.
Almost without exception, Adaptabel fits every standard conduit box, whether concealed or surface type. Mounting is equally simple in non-conduit work.

3. MECHANICALLY SUPERIOR.
Precision-built to a radically new (pat. pending) design that actually compensates for normal wear, Adaptabel has no springs or contacts to adjust . . . no exposed mechanism or connectors to rust, corrode or collect dirt.

4. CHOICE OF TYPES.
Edwards new Adaptabel is available in 4, 6 and 10" sizes—with voltages, as required, up to 250 volts, 60 cycles.

SIMPLE, ECONOMICAL INSTALLATION

1. Mount plate on wall or on any switchbox, outlet box, Conduit or Wiremold type fitting.

2. Connect wires. Large, convenient binding posts give plenty of working room.

3. Just slip Adaptabel on the sturdy hanger . . . nothing complicated.

4. Last step . . . just push Adaptabel home and secure with exposed screw. Job is finished.

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FOR FACTORIES, OFFICES AND SCHOOLS

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WORK BETTER
—because they're made better!

TAKE A GOOD LOOK AT THE TAPE YOU USE—

Every package of ACCURATE tape helps you produce better taped joints in less time. You know this as soon as you've stripped the first length off a new roll. The tape peels off straight and neat without ravelling —tapes up tight and even on the joint —and breaks clean right where you tear it. ACCURATE tapes work better because they're made by men who specialize in tape making.

—if it's ACCURATE TAPE here's what you'll find!

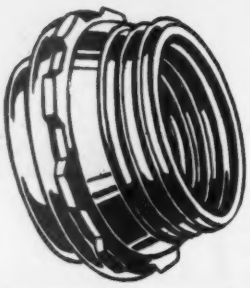
First you'll see proper protective packaging. Substantial protective carton; heavy cellophane wrapper inside. Hold a length to a bright light—no pinholes anywhere. Then, when you use it, you'll notice ACCURATE tape never creeps or ravels and breaks off straight and neat. There's more than meets the eye, too. Every foot of ACCURATE tape is made to ASTM Standards and every roll contains guaranteed footage. That's why—when you buy ACCURATE tapes—you get real tape value. Next time you need tape—order ACCURATE. Write for catalog and name of distributor nearest you.

ACCURATE MFG. COMPANY

GARFIELD, NEW JERSEY

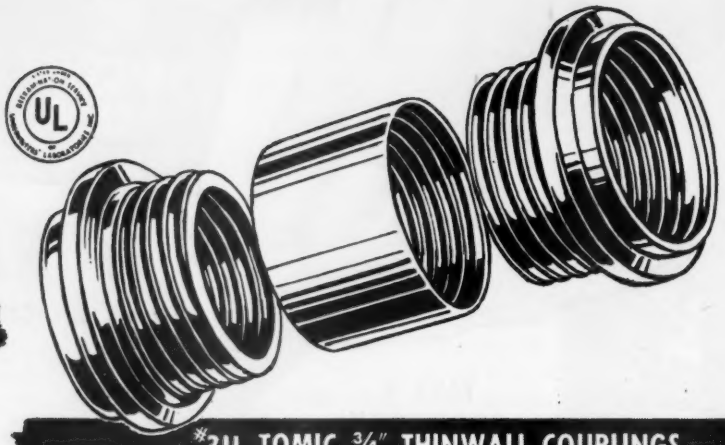
25 YEARS MAKING TAPES EXCLUSIVELY

NEW!



#11 TOMIC ¾" THINWALL CONNECTOR

Interior stainless steel lock washer holds tubing securely, makes uniform, safe, permanent, vibration-proof 6-point ground around entire tube! Rain-tight—OK outdoors and in concrete slabs. No inside ridges to snag fishtape or fray wire. Easy to install—easy to inspect. Ideal for cramped or corner locations. Simple, strong, solid construction, galvanized finish.



#311 TOMIC ¾" THINWALL COUPLINGS

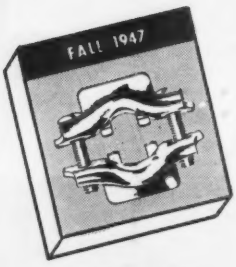
Screws in on straightaway jobs . . . snaps in on corner jobs! No tools needed! Will never shake loose! Positive ground! Smooth raceway assured! Easy to install—easy to inspect! Simple, strong construction! Change from conduit to Thinwall in middle of a job, without special expensive fittings!

ALWAYS SOMETHING NEW AT

TOMIC

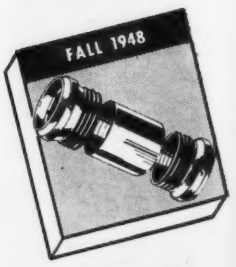
Tomic No. 100 Romex Cable Connector for ½" K.O. Pat. 2097695 2419426

Tomic No. 200 Service Entrance and Range Connector for ¾" K.O. Pat. 2097695 2419426



Tomic No. 333BX Armored Connector for ½" K.O. Pat. 2097695 2419426

Tomic No. 10 EMT Thinwall Connector for ½" K.O. (Pat. 2458276)



Tomic No. 310 ½" EMT Coupling (Pat. 2458276)

TOMIC SALES & ENGINEERING CO.

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Yes, a long future that's full of satisfaction to the home owner. Wiring that you can specify and install with confidence. For the home wired today with Paranite Building Wire — Paraflex — ABC Cable — Service Cable — will be giving the same efficient electrical service in 1998 and beyond. Every bit of Paranite wire or cable is made under the watchful eye of SQC — Statistical Quality Control! Nothing is left to chance. Scores of tests, graphs, measurements — figures and figures — by columns and rows of columns — are compiled and analyzed, while the individual operations are still in progress. With Paranite's goal set high and Statistical Quality Control guarding each individual operation, you can confidently recommend and use Paranite Wires and Cables in all construction.

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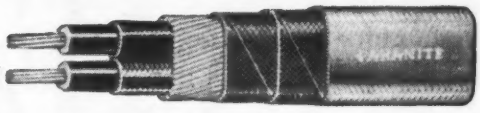
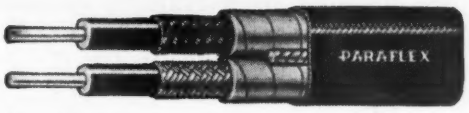
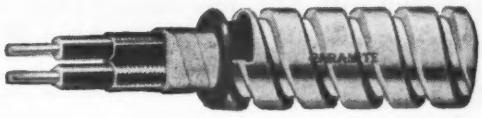
Types R — RH — RW — T — TW



Service Entrance Cable



Paraflex
Non-Metallic Sheathed Cable



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Flexible Metallic Cable

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ELECTRICAL WIRES AND CABLES *"BETTER THAN CODE REQUIRES"*

Here it is—

Designed to make the most of T-12 Slimline's lower surface brightness and greater lumen output

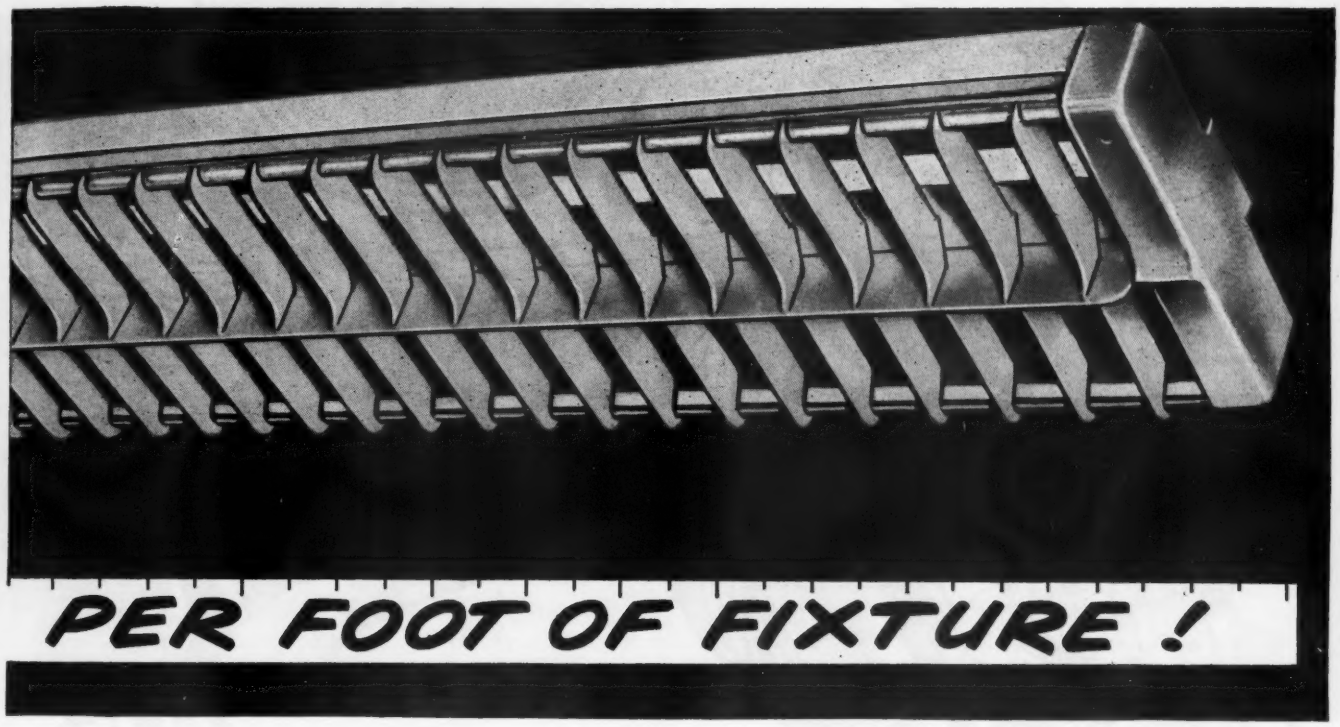
SYLVANIA's new 8-foot Slimline fixture—the CL-296—is a 2-lamp louvered unit scientifically designed to capitalize on the many unique advantages of 75-watt instant-start Slimline lamps in the new T-12 diameter. These amazing new 8′ lamps deliver more lumens per foot than former Slimline types—but with 22% less surface brightness. At the same time, they provide a 20% increase in maintained lumens over the life of the lamp.

But to make the most of these lamp advantages, you've got to have a fixture designed specifically for T-12 operation. And that's what you have—in Sylvania's CL-296. Here's why:

Louvers and reflector are skillfully engineered to deliver maximum light output with minimum surface brightness. For example, when pendant mounted, the CL-296 has an approximate photometric efficiency of 85% and distributes 55% of its light upward and 45% downward. Its angle of cutoff is 30° lengthwise and 30° crosswise. Reflecting surfaces are finished in Sylvania's exclusive high-temperature baked Miracoat—with a reflection factor of not less than 86%.

Hanging Features—On jobs calling for long rows of light—store aisles, offices, etc.—the CL-296 is a money-saver because this 8′ unit can be installed in much less time than two 4′ units. For pendant mounting, a single-stem set is used at each end. For continuous rows, one joining assembly replaces the end caps.

The 8-foot instant-start fixture that really puts T-12 Slimline lamps to work



PER FOOT OF FIXTURE !

Maintenance Features!

Relamping is quick and easy—because the luminous side-panels are readily removed without disturbing the louvers. Sylvania's new Butt-On Slimline Lampholders permit lamps to be snapped into place in a jiffy—and hold them firmly by spring pressure. And because these lamps are instant start, there are no starters to replace at any time.

The CL-296 is UL approved, and is equipped with a HPF ballast of approximately 38 watts, for 425 milliamperes operation. Length is 97½", width 15-7/16", overall depth only 6".

Like all Sylvania fixtures, the CL-296 is delivered complete with lamps and, in installations of 25 or more at one time, carries Sylvania's famous one-year guarantee.

These are just a few of the features that you'll like about the new CL-296—which represents Slimline Fluorescent At Its Finest. Mail the coupon now for the whole story.

SYLVANIA ELECTRIC

Mail this coupon today!

Sylvania Electric Products Inc.
Advertising Dept. L-6005
500 Fifth Avenue, New York 18, N. Y.

Gentlemen: Send full particulars on your new CL-296 Instant Start Fluorescent Fixture.

Name.....

Address.....

City.....*Zone*.....

State.....

PHOTOLAMPS; RADIO TUBES; CATHODE RAY TUBES; ELECTRONIC DEVICES

YOUR CENTRAL CONDUIT DISTRIBUTOR WORKS HARD AT KEEPING *Everybody Happy!*

● The great demand for conduit has made it difficult for your distributor to satisfy everyone's requirements completely. But your Central Conduit Distributor works hard and faithfully at trying to keep everybody happy. He makes every effort to fairly divide his available supply of conduit among his customers. This often means extra deliveries which increase his overhead . . . but he's glad to do it, just so all of his customers get a fair share of his supply.

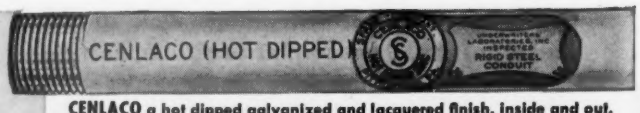
We, too, are trying to expedite your orders by trying every way we know how to produce greater quantities of Central Rigid Steel Conduit. But even these efforts have not been enough to keep pace with the tremendous demand for Central Rigid Steel Conduit. However, we shall continue to produce as much conduit as we possibly can. We know that's the best way we can help your distributor get what you want when you want it.

SPANG-CHALFANT

Division of The National Supply Company

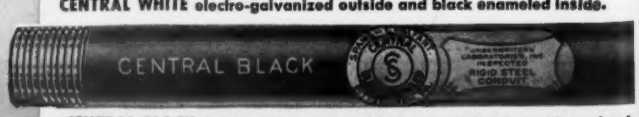
General Sales Office: Grant Bldg., Pittsburgh, Pa.

District Offices and Sales Representatives in Principal Cities



CENLACO a hot dipped galvanized and lacquered finish, inside and out.

CENTRAL WHITE electro-galvanized outside and black enameled inside.



CENTRAL BLACK permanent, baked-on black enamel finish, inside and out.

RACO is a 3-way winner!

The RACO Line has won the wholehearted acceptance of Contractors—
It's won the confidence of Architects—
It's won the enthusiastic support of Jobbers and Wholesalers!

Championship of products in the building trades, however, has to be well earned. RACO's complete line of switch and outlet boxes has earned its top position on many counts—contractors depend upon the workmanship, quality, and careful inspection of RACO Boxes to insure quick installation. Architects know that RACO Boxes are dependable. The wide acceptance of the RACO Line assures wholesalers of quick turnover and steady demand. The RACO Line is approved by the Underwriters' Laboratories, Inc.

You can always rely on RACO!

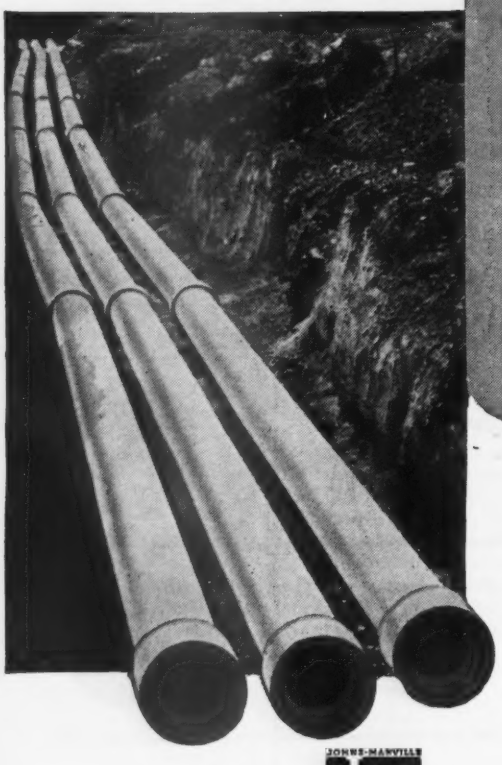
RACO

ALL-STEEL PRODUCTS

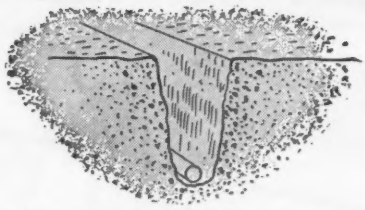
ALL-STEEL EQUIPMENT Inc.—800 Kensington Ave., Aurora, Illinois

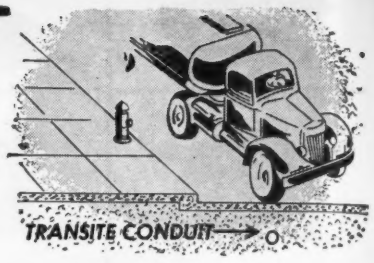
"A BOX FOR EVERY NEED"

Do you know these facts about TRANSITE DUCTS?



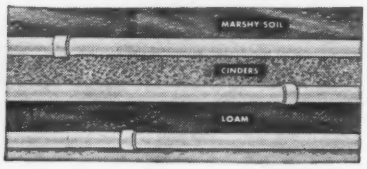
TRANSITE CONDUIT

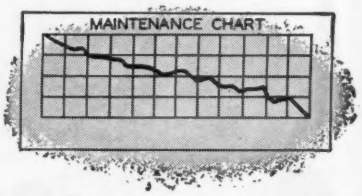




This durable duct is for use underground, or on exposed locations without a protective casing . . .

Under sustained earth loads and traffic pressure, it maintains its strength and true form . . .

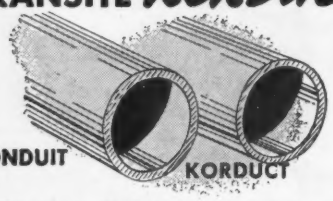


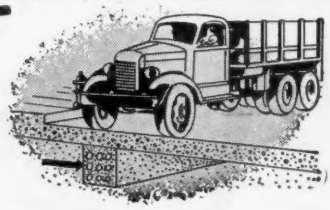


Transite Conduit effectively resists weather, smoke and fumes . . . is virtually unaffected by corrosive soils . . .

Its cost is low and, in service, it is much more economical than other materials of comparable strength and durability.

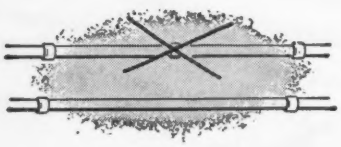
TRANSITE KORDUCT

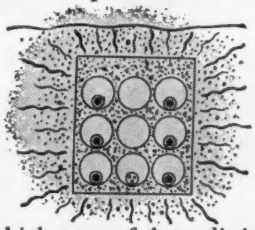




Thinner walled, lower priced than Transite Conduit, Transite Korduct is for use where an encasement is specified . . .

Because Korduct is incombustible, less concrete is required between ducts to provide the necessary degree of fire protection.





Its long lengths (10 feet) mean fewer joints, reducing the number of spacers required . . .

Its high rate of heat dissipation lowers cable operating temperatures . . . increases system capacity . . .

. . . *In addition,* both Transite Conduit and Transite Korduct have these characteristics:

1. INCOMBUSTIBLE—made of asbestos and cement, they cannot burn . . . will not contribute to the formation of dangerous smoke, fumes or gases.

2. IMMUNE TO ELECTROLYSIS—Transite Ducts are nonmetallic and inorganic . . . unaffected by electrolysis.

3. SMOOTH BORE—Making cable pulls easier, both at initial installation and after years of service.

4. EASILY INSTALLED—Lining up is fast and accurate because Transite Ducts combine lightweight, long lengths, simple assembly.

For details and specifications, write for Data Book DS-410, Johns-Manville, Box 290, New York 16, N. Y.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville TRANSITE DUCTS

TRANSITE KORDUCT—for installation in concrete

TRANSITE CONDUIT—for exposed work and installation underground without a concrete encasement

LVD Flex-a-power

STOP, LOOK AND READ HOW EASILY

CUTS INSTALLATION COST

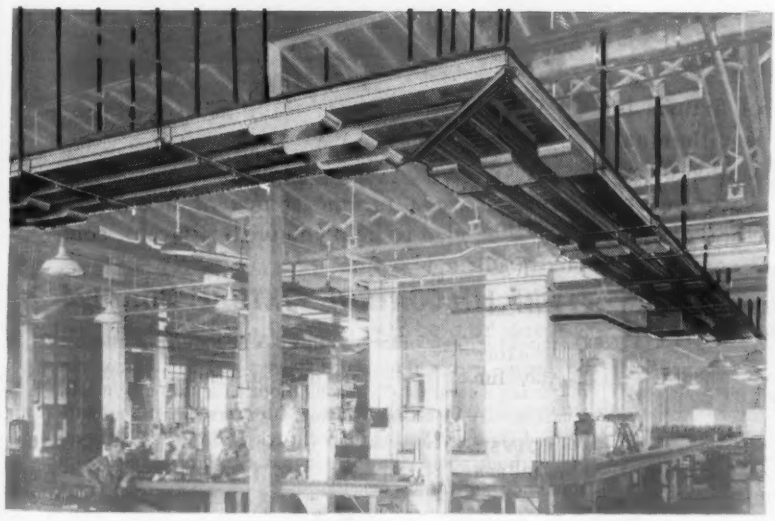
KEEPS MAINTENANCE LOW

GIVES MAXIMUM BUSWAY FLEXIBILITY

Because Trumbull LVD FLEX-A-POWER® is made in pre-fabricated units, you save money with this system these three ways.

The units are easily and quickly put together . . . no special engineering skill is required for installation. This means that many expensive time and labor costs are eliminated for a *lower "installed cost."*

Not only is LVD pre-fabricated, but it is pre-engineered so that you can predetermine electrical performance before actual installation. This advantage is an important factor in minimizing voltage drop and in keeping machine efficiency high.



LONG-LIVED MATERIALS —

Another advantage — LVD FLEX-A-POWER materials do not deteriorate even under the most severe operating conditions, thus assuring years of satisfactory service *without costly maintenance repairs.*

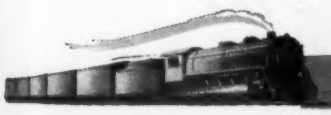
ADAPTABLE, "TAKE-APARTABLE" —

LVD FLEX-A-POWER is readily adaptable to any power distribution problem you may have. Fast to install, its convenient "take-apart-ability" allows you to relocate your LVD system without replacing a single part!

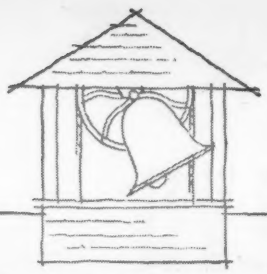
Learn more about the many advantages of LVD. Write for Circular TEC 152 today. THE TRUMBULL ELECTRIC MANUFACTURING COMPANY, Plainville, Conn.

Men Who Observe the Best Electrical Practice Make It a Practice to Use

TRUMBULL (T) ELECTRIC



TRUMBULL'S TRAINLOAD OF NEW PRODUCTS

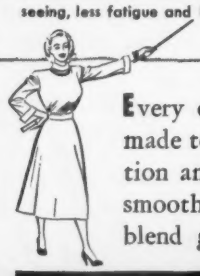


Little Red Schoolhouse that's **Easy on the Eyes**

. . . THE KALER SCHOOL, SOUTH PORTLAND, MAINE

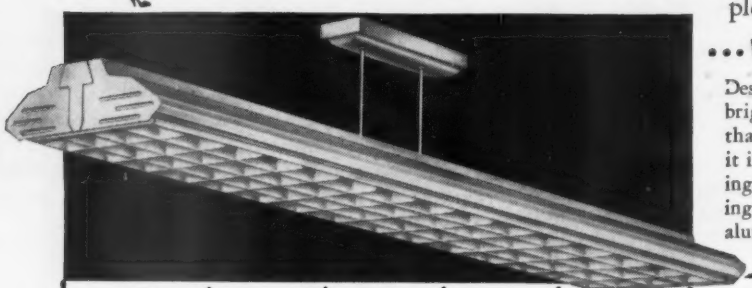
Young eyes in this Portland schoolroom have a far better chance, thanks to this well-designed lighting installation. Suspended on 12" stems these Litecontrol fixtures are arranged in two continuous rows of 24 feet each. Illumination at desk level is strong, even and without glare—features that mean easy seeing, less fatigue and better marks.

Architect: John Calvin Stevens • Lighting Engineer: Norman F. Ross, Central Maine Power Co. • Lighting Equipment: Litecontrol No. 4124, 2-lamp louvered fixture • Lamps: 40 Watt — 3500 white • Total Wattage: 1200 • Watts per Square Foot: 1.6 • Footcandles: 45 Initially



Every one of the many Litecontrol fixtures is made to be "easy on the eyes" in *both* illumination and appearance. They are designed to put smooth, evenly diffused light on work areas—blend gracefully into any architectural design. And once installed, the sturdy construction insures more years of service.

Specialists in better lighting, Litecontrol engineers are a prolific source of new ideas. They'll be glad to help you with advice or complete lighting layouts.



Cat. No.	Lamps	Length	Width	Height
4124	2-40w	49"	12"	5¼"

Adjustable spotlight No. 4100-22 available for use in continuous runs for either surface or pendant mounting. No. SC-1 Double Pendant, 24" stems; No. P-1 Single Pendant, 24" stem.

...with LITECONTROL FIXTURE NO. 4124

Designed for "ease of seeing" this 2-lamp fixture has the low brightness, evenly illuminated louvers and trim appearance that make it ideal for classroom or office use. Easy to install, it is also easy to maintain. Hinged louvers simplify relamping and cleaning. Spring loaded catches permit louver opening without tools. Finished in baked white enamel with aluminum end cap ornaments.

LITECONTROL CORPORATION
36 PLEASANT STREET, WATERTOWN 72, MASSACHUSETTS

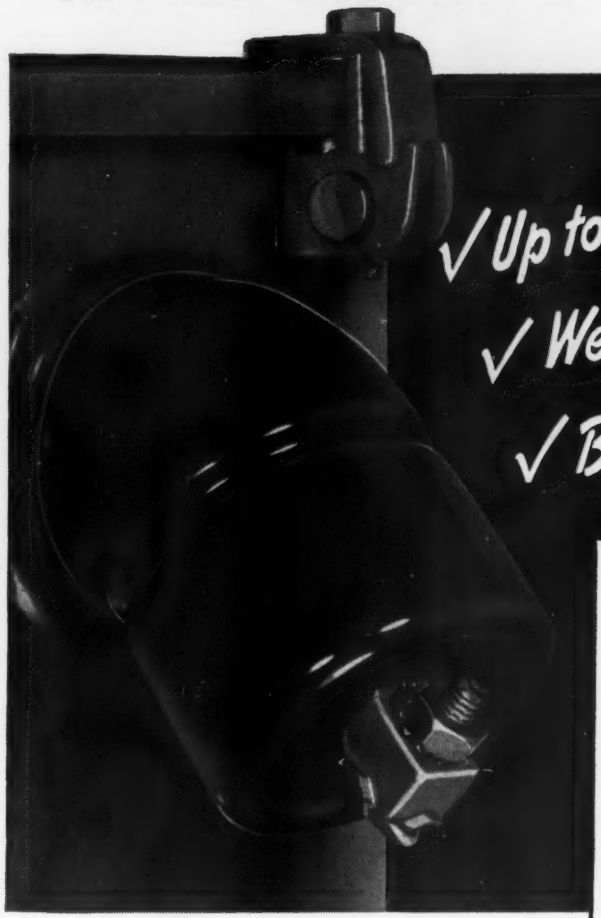
LITECONTROL *Fixtures*
KEEP UPKEEP DOWN

DESIGNERS, ENGINEERS AND MANUFACTURERS OF FLUORESCENT LIGHTING EQUIPMENT DISTRIBUTED ONLY THROUGH ACCREDITED WHOLESALERS

ANNOUNCE

New Bushing

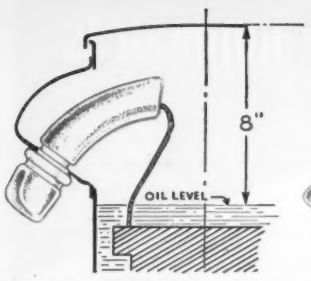
on Allis-Chalmers Distribution Transformers



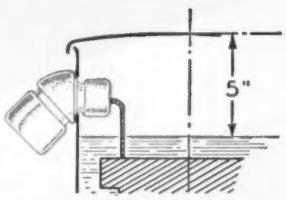
✓ Up to 3" Reduction in Tank Size

✓ Welded Pocket Seams Eliminated

✓ Bushing Installation Simplified



OLD DESIGN required more space above oil level because of longer bushing shank.



NEW BUSHING saves up to 3" in tank height . . . eliminates need for bushing pockets.

THIS NEW TANK WALL BUSHING reduces tank height as much as 3" . . . makes A-C distribution transformers smaller and easier handling than ever before!

Size reductions result from space-saving contour of the new bushing which eliminates need for high voltage bushing pockets. These reductions are *in addition* to savings already made through use of highly oriented electrical core steel.

A one-piece retaining ring holds the bushing in place. Bushing is simply adjusted by set screws. Critical porcelain tolerances between bushing and ring are eliminated.

Any shock ordinarily transferred to the bushing by a metal-to-porcelain contact is absorbed by a locking spring behind the retaining ring. Increased wall thickness, together with straighter, shorter shank contour, further increases mechanical strength of the bushing.

The new design is supplied in transformers from 3 to 100 kva, single phase, and from 9 to 150 kva, three phase, in voltages up to 4800/8320Y.

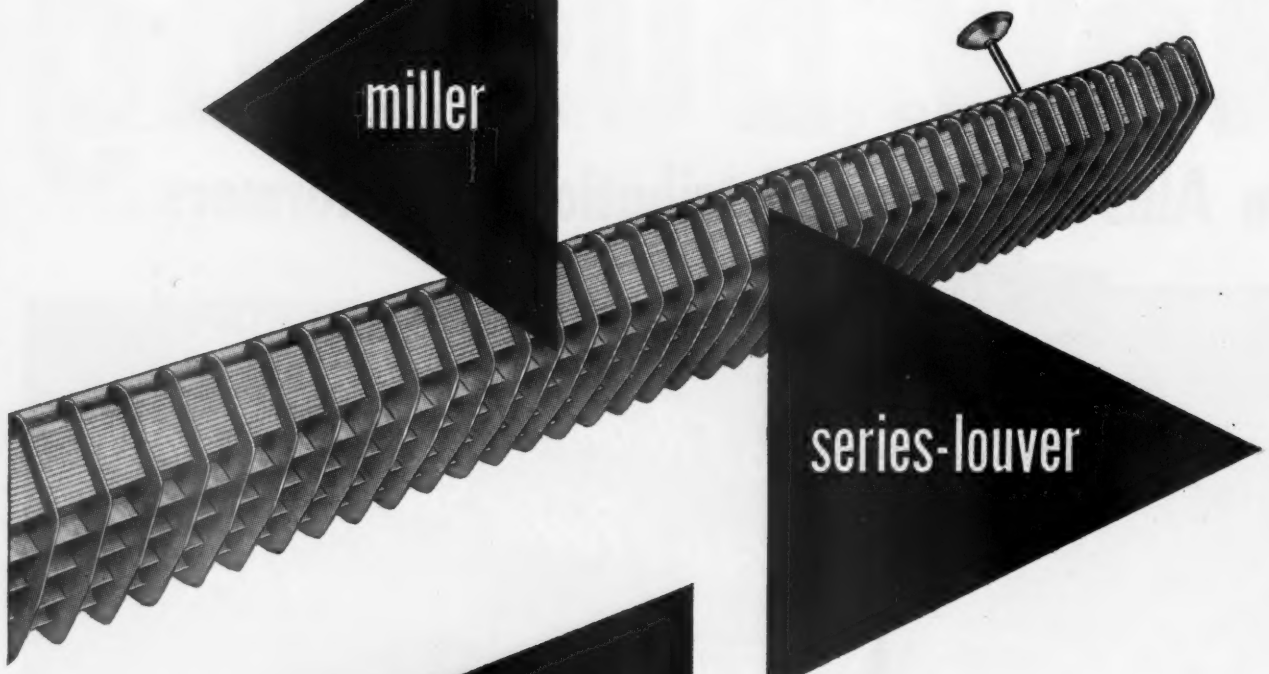
Contact your nearby A-C sales office for further details on this new bushing, or for other facts about Allis-Chalmers quality distribution transformers. A 2703

ALLIS-CHALMERS, 930A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment—Biggest of All in Range of Industrial Products

ANNOUNCING



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series-louver

slimline luminaires

for commercial and industrial interiors

a new high in lighting

New flexibility of application
of the 96 in. slimline fluorescent lamp.
New simplified installation,
operation and maintenance.
Write for miller slimline catalog 2G.

3

THE miller COMPANY
SINCE 1844
ILLUMINATING DIVISION, MERIDEN, CONNECTICUT
ILLUMINATING DIVISION: Fluorescent, Incandescent, Mercury Lighting Equipment: HEATING PRODUCTS DIVISION: Domestic Oil Burners and Liquid Fuel Devices: ROLLING MILL DIVISION: Phosphor Bronze and Brass in Sheets, Strips and Rolls

WHAT—*no wires?*

That's about it when Electric Feedrail, the modern, totally enclosed, electrical distribution system is used.

One vertical cable connected to an overhead trolley, through an Ever-Lok trouble-proof connector—no wires to trip over, snag or tangle, no exposed circuits—and you can move the equipment along the line without disconnecting.

Feedrail is also ideal for cranes and hoists, moving test lines, and lighting. In fact, anywhere electrical equipment moves. You can save wiring costs, maintenance time, speed up your plant, and make it electrically safe at the same time.

See what others are doing with Electric Feedrail. The new 32 page catalog, No. 20, with more than 100 illustrations and layouts and diagrams, and complete specification data, is yours for the asking. Write for yours now.

25

ELECTRIC FEEDRAIL

FEEDRAIL CORPORATION

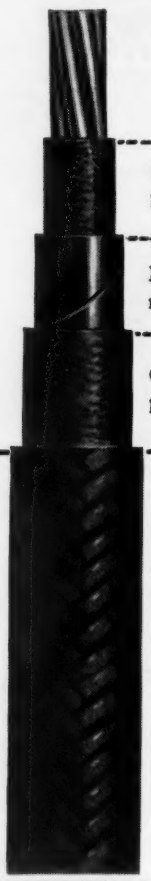
Subsidiary of Russell & Stoll Company, Inc.

125 BARCLAY STREET • NEW YORK 7, N. Y.

"...galvanized conduit corroded"

so they switched to

ROCKBESTOS A.V.C.


Inner protective impregnated asbestos wall
High dielectric varnished cambric tapes
Outer protective impregnated asbestos wall

THE AVC SANDWICH

High dielectric tapes sealed from air by two asbestos insulating walls.

Where moisture, fumes and heat corroded galvanized conduit, a large Mid-western electric utility replaced ordinary rubber covered cables with this Rockbestos AVC.

The circuits were in a damp, low ceiling basement area adjacent to open ash hoppers and exposed to ash discharge belt conveyors. Moisture, heat, sulphur and other coal gasses corroded the galvanized conduit before it was covered with asphalt paint.

This company chose and installed Rockbestos AVC because its impregnated felted asbestos insulation forms impervious barriers protecting the high dielectric varnished cambric tapes from conditions that destroy ordinary insulations.

Another case where "low-cost" cables cost more in the end . . . where a switch to ROCKBESTOS AVC meant dependability—and *true economy*. Rockbestos AVC is doing the job.

You'll want to know the full Rockbestos Story — Write.

ROCKBESTOS PRODUCTS CORPORATION
NEW HAVEN 4, CONNECTICUT

NEW YORK CLEVELAND DETROIT CHICAGO
PITTSBURGH ST. LOUIS LOS ANGELES OAKLAND, CALIF.

WIRES and CABLES *by*

ROCKBESTOS

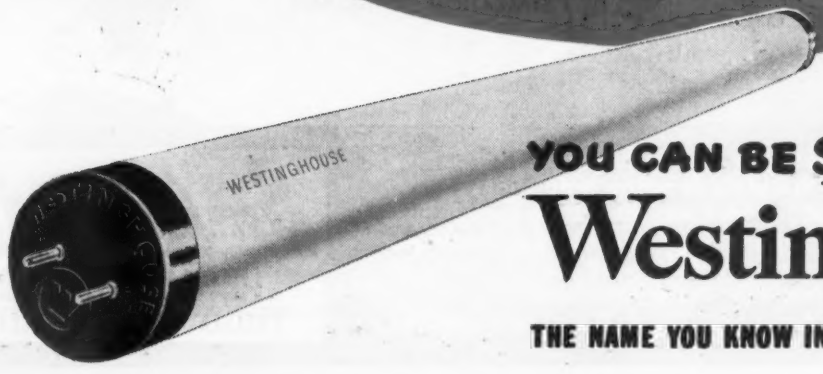
....dare to be better

tests like this

To assure uniform brilliancy, a Westinghouse worker in the Fairmont, W. Va. plant gives "Easter egg" test to 100-watt fluorescent lamp. The brilliant radiation of this industrial lamp is measured through a tiny hole in sphere's side by an electric eye.

make Westinghouse Fluorescent Lamps

WORK SO WELL · BURN SO BRIGHT · LAST SO LONG

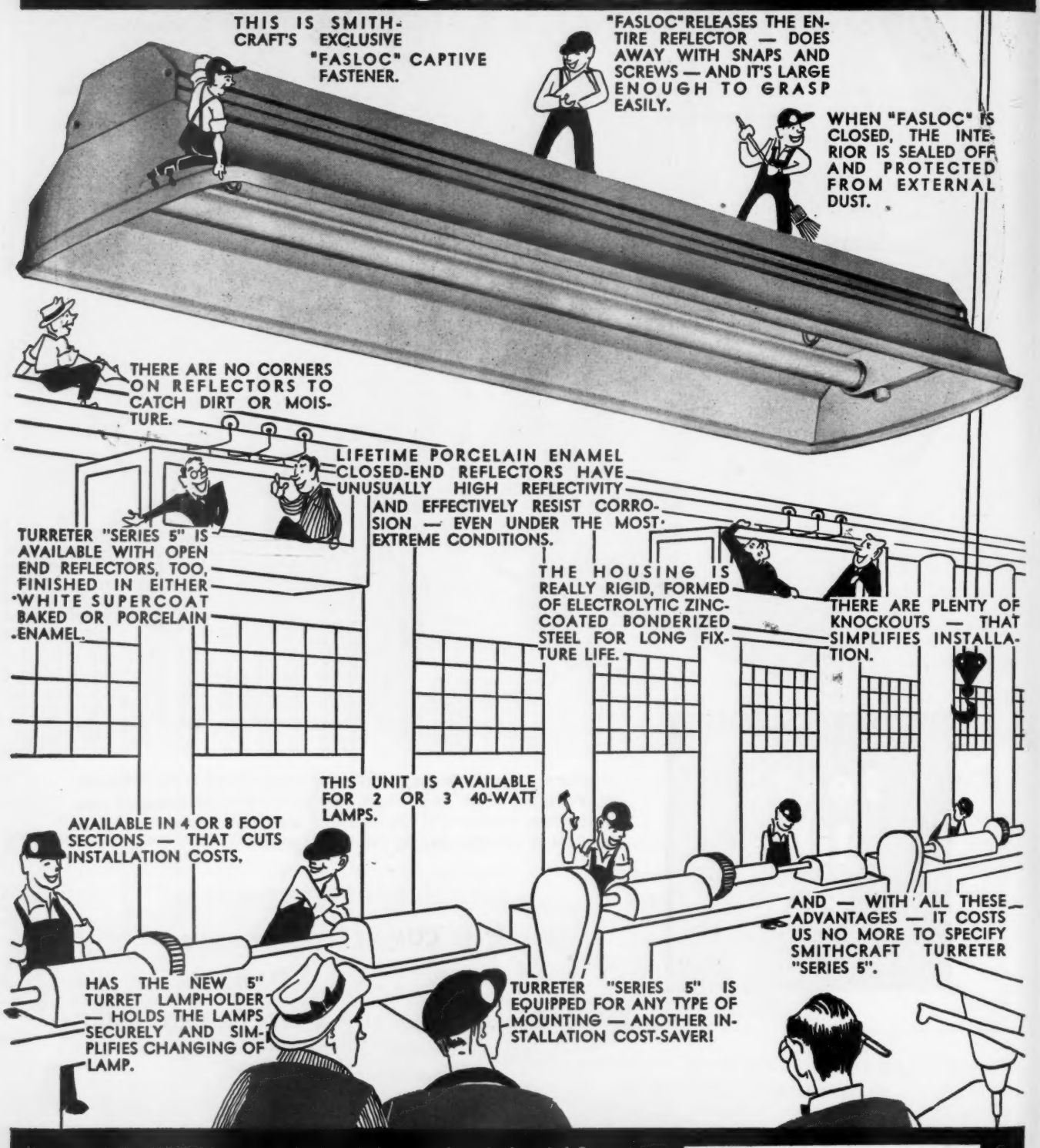


YOU CAN BE SURE...IF IT'S

Westinghouse Lamps

THE NAME YOU KNOW IN

this is the sensational NEW Smithcraft TURRETER "Series 5"

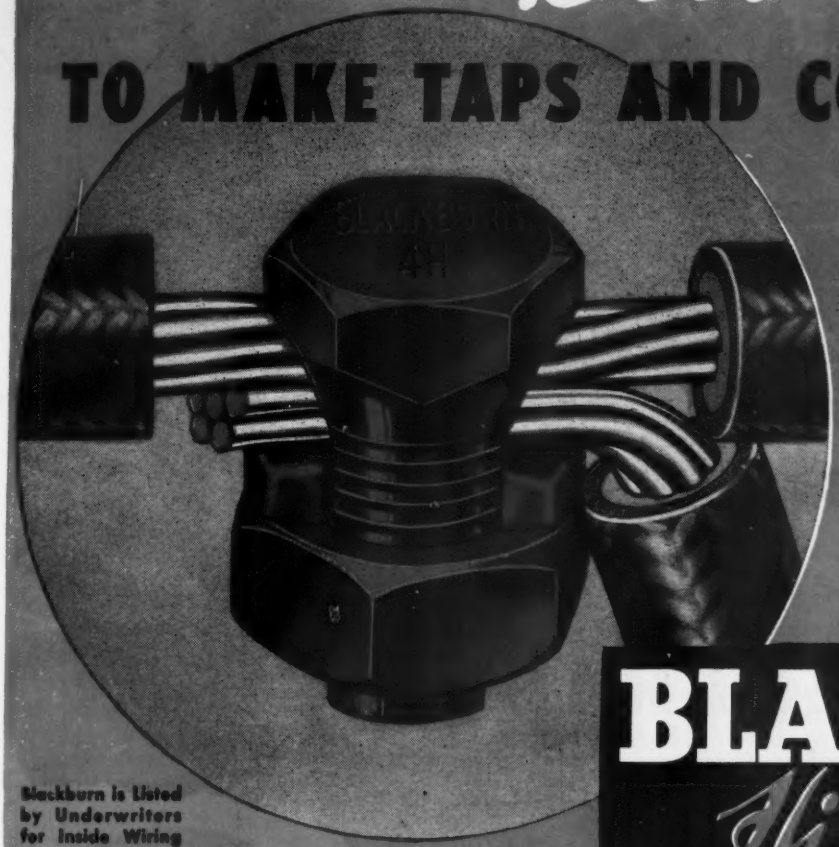

THIS IS SMITH-CRAFT'S EXCLUSIVE "FASLOC" CAPTIVE FASTENER.
"FASLOC" RELEASES THE ENTIRE REFLECTOR — DOES AWAY WITH SNAPS AND SCREWS — AND IT'S LARGE ENOUGH TO GRASP EASILY.
WHEN "FASLOC" IS CLOSED, THE INTERIOR IS SEALED OFF AND PROTECTED FROM EXTERNAL DUST.
THERE ARE NO CORNERS ON REFLECTORS TO CATCH DIRT OR MOISTURE.
LIFETIME PORCELAIN ENAMEL CLOSED-END REFLECTORS HAVE UNUSUALLY HIGH REFLECTIVITY AND EFFECTIVELY RESIST CORROSION — EVEN UNDER THE MOST EXTREME CONDITIONS.
TURRETER "SERIES 5" IS AVAILABLE WITH OPEN END REFLECTORS, TOO, FINISHED IN EITHER WHITE SUPERCOAT BAKED OR PORCELAIN ENAMEL.
THE HOUSING IS REALLY RIGID, FORMED OF ELECTROLYTIC ZINC-COATED BONDERIZED STEEL FOR LONG FIXTURE LIFE.
THERE ARE PLENTY OF KNOCKOUTS — THAT SIMPLIFIES INSTALLATION.
THIS UNIT IS AVAILABLE FOR 2 OR 3 40-WATT LAMPS.
AVAILABLE IN 4 OR 8 FOOT SECTIONS — THAT CUTS INSTALLATION COSTS.
AND — WITH ALL THESE ADVANTAGES — IT COSTS US NO MORE TO SPECIFY SMITHCRAFT TURRETER "SERIES 5".
HAS THE NEW 5" TURRET LAMPHOLDER — HOLDS THE LAMPS SECURELY AND SIMPLIFIES CHANGING OF LAMP.
TURRETER "SERIES 5" IS EQUIPPED FOR ANY TYPE OF MOUNTING — ANOTHER INSTALLATION COST-SAVER!

Turreter "Series 5" by Smithcraft is a heavy-duty industrial fixture, designed specifically to meet the most exacting industrial requirements. Low initial cost, simplified maintenance and installation, comfortable cut-off from lamp glare, high construction standards . . . these and many other exclusive Smithcraft fixtures are important reasons for specifying the Turreter "Series 5" — by Smithcraft, manufacturer of America's finest fluorescent fixtures.

Smithcraft
LIGHTING DIVISION
CHELSEA 50, MASSACHUSETTS

The Best Way

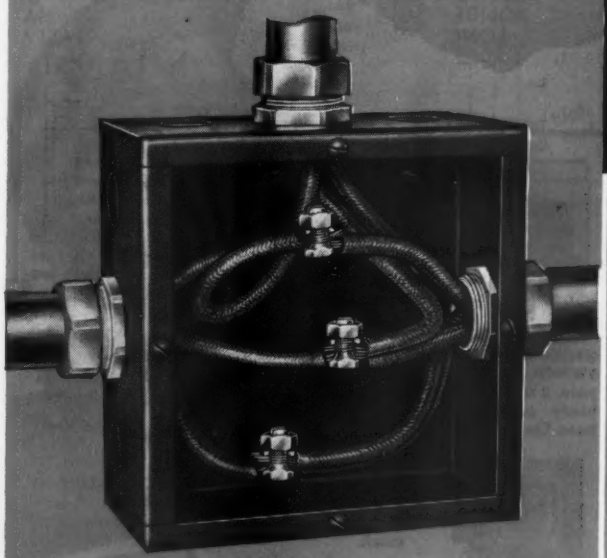
TO MAKE TAPS AND CONNECTIONS-



HANDIEST!--- MOST ECONOMICAL!

Blackburn is Listed by Underwriters for Inside Wiring

BLACKBURN *Hi-Strength* CONNECTORS



Tap made in junction box with Blackburn Hi-Strength Connectors

Millions in Use Throughout the World

The UNIVERSAL connector—ideal for any use.

The HANDY connector—very easy to use.

The ECONOMICAL connector—low initial cost plus labor saving.

The COMPACT connector—small, easy to tape.

The RELIABLE, PERMANENT connector—made of DURONZE, 50% stronger than hard copper or commercial bronze. High strength, at no extra cost!

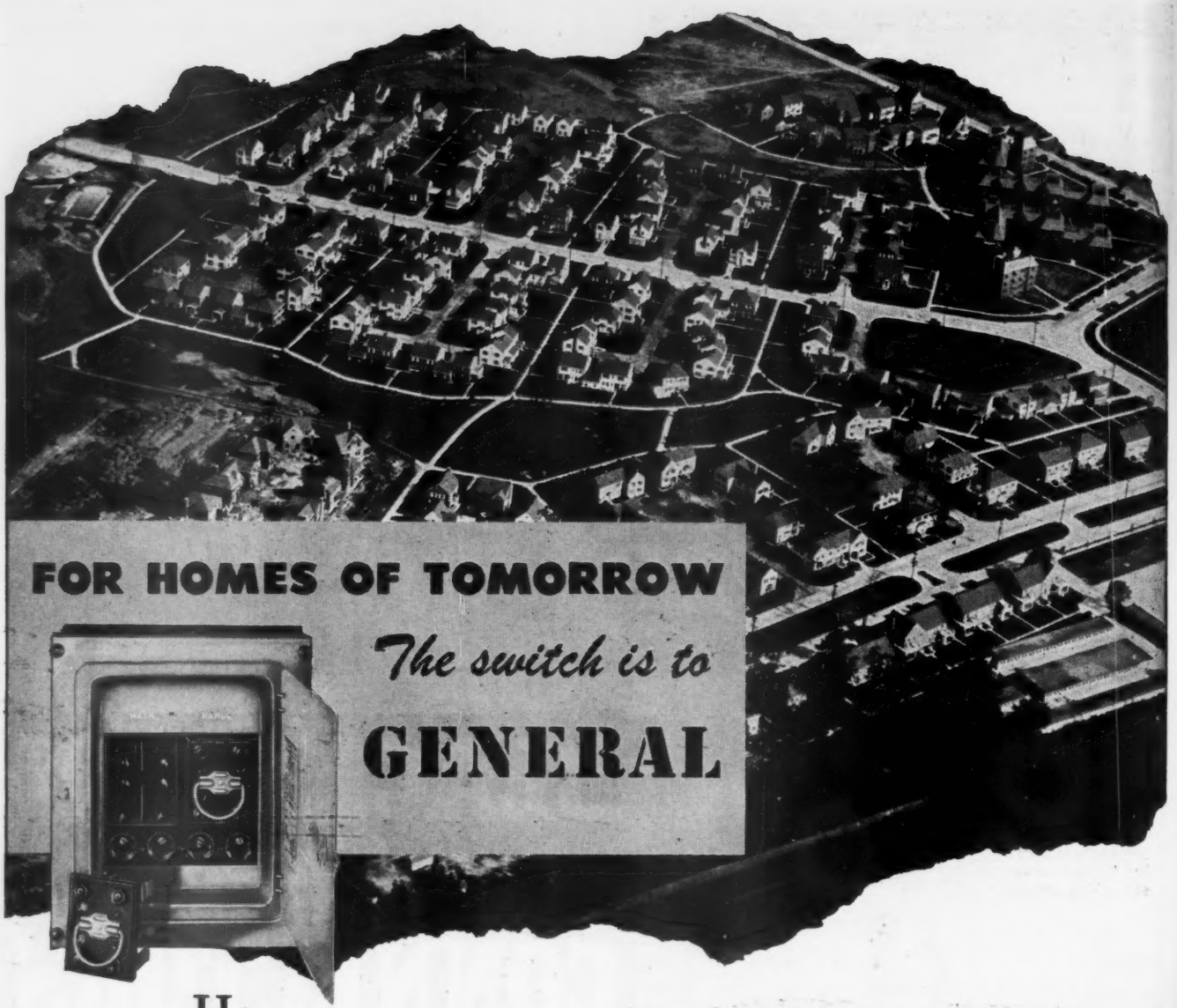
Listed by Underwriters.

•

ORDER FROM YOUR JOBBER
WRITE FOR SAMPLES AND NEW CATALOG

JASPER BLACKBURN PRODUCTS CORP., First, Madison & Clinton Sts. • St. Louis 6, Mo.

BUILDERS OF QUALITY PRODUCTS FOR 15 YEARS



FOR HOMES OF TOMORROW

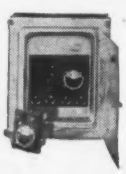
The switch is to

GENERAL

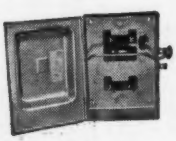
HOMES of tomorrow demand the best of today! That's why more and more electrical contractors—builders—architects—and wholesalers are switching to GENERAL!

GENERAL SWITCH CORP. specializes in the construction of Safety Switches, Service Entrance Equipment, Branch-Circuit or Residence Panels, Panelboards for Light and Power Distribution . . . for luxury type and low-cost housing projects. Safety Switches available from 30 through 1200 AMP.—250 V. and 600 V.—Type A, C and D—indoor and outdoor—horsepower rated.

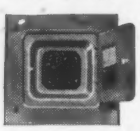
Wherever quality—safety—convenience—endurance—trouble-free performance—ease of installation—and low maintenance costs are the first consideration, *the switch is to* GENERAL!



GENERAL MAIN AND RANGE COMBINATION. (Cat. No. 6214, surface or flush.) The most economical switch for range installations. Double pullout switch with one 60 AMP main and one 60 AMP range switch in series (also parallel). 4 lighting circuits (6 and 8 also available). Has 60 AMP sub-feed pressure wire connectors for water heater or other 220 V. circuits.

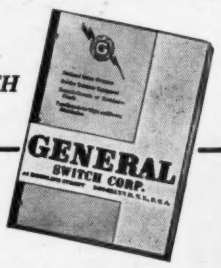


GENERAL EXTERNALLY OPERATED SAFETY SWITCH. (Cat. No. 1003N.) 100 AMP., 3 pole, 2 fuse switch with solid neutral. Knife blade construction. Plastic composition base. Quick-Break. Ample space for wiring.



GENERAL PLUG FUSE BRANCH-CIRCUIT or RESIDENCE PANEL. (Cat. No. 104, surface or flush.) Available up to 32 circuits. Flush spring catch.

Ask your wholesaler or write today for the GENERAL SWITCH 68-page catalog.

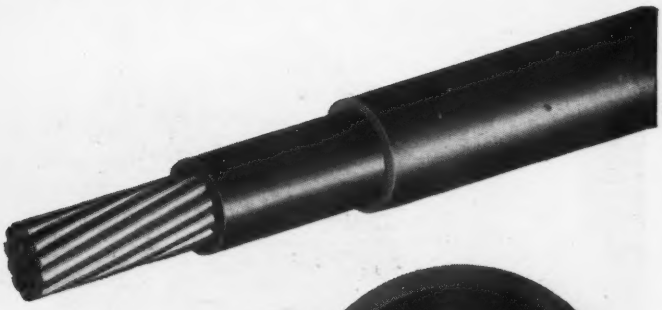


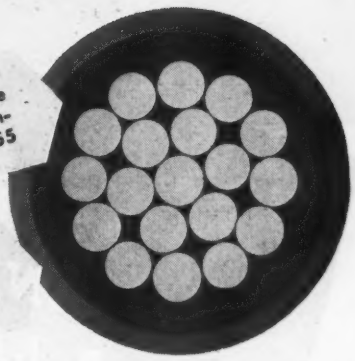
Distributed through wholesalers

GENERAL SWITCH CORP.

49 ROEBLING STREET, BROOKLYN 11, N. Y. • *Sales Offices in every major city*

RoMarine - RoPrene




RoMarine, a performance type insulation conforming to ASTM Spec. D-755
RoPrene, a tough Neoprene sheath conforming to ASTM Spec. D-752

Underwriters' Approved as Type USE—Style RR

Rome's multi-purpose cable for service entrances, power distribution— indoors or outdoors

Because of its all-around serviceability... its simplicity of construction... its ease of handling... and, more than that, its long-lived service, RoMarine-RoPrene is the practical and economical cable for underground or overhead installation.

Installed aerially, in ducts, on open racks, or by direct earth burial, RoMarine, a high quality moisture resistant insulation... *plus* its all-resistant RoPrene (Neoprene) sheath... provides *double* protection against power failure.

RoMarine insulation for high moisture resistance and long life...
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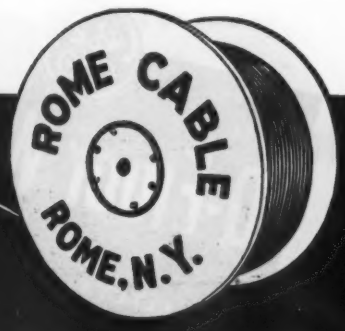
Specify RoMarine-RoPrene for: Underground Net-work Circuits • Transformer Leads • Pole Riser Cables • Station Control Circuits • Service Entrances • Industrial Plants • Rural Electrification • Airport Lighting • Outdoor Theater Sound and Lighting.

Available as single and multiple conductor in a wide range of sizes. Write for Specification RR-1 today.

FROM BAR TO FINISHED WIRE

ROME CABLE CORPORATION

ROME • NEW YORK



New building addition to Country Life Press, Garden City, N. Y., containing 110,000 sq ft of floor space with electrical raceways always quickly and conveniently available.

PLANNED FOR A LIFETIME

Q-Floor in place on first floor. Notice large number of cells—everyone available for wiring.

CONSTRUCTION DATA

Architect:.....H. T. Lindeberg
General Contractor:..George A. Fuller Company
Consulting Engineer:.....Clyde R. Place
Electrical Contractor:..Naumer Electric Company

Country Life Press, Garden City, New York, needed a wiring system that would permit fast relocation of electric equipment—a wiring system that would be readily adaptable to changes in circuits and outlets with a minimum of expense. When they planned this new 110,000 sq-ft plant addition, they could determine initially needed electrical and signal outlets. However, it was practically impossible to estimate future demands. To meet these, Country Life included Robertson Q-Floors with General Electric Q-Floor Wiring, to give them the electrical flexibility they needed.

Buildings equipped with General Electric Q-Floor Wiring enjoy a decided advantage. At any time during the life of the building, circuits can be removed or new outlets can be installed on the floor surface where they are needed, when they are needed, in a few minutes. Changes can be made easily and quickly, without digging trenches, and without interrupting occupants' activities.

By means of simple fittings, the entire Q-Floor becomes part of the electrical and signal distribution system. Since the cells are on 6-inch centers, outlets can be installed every six inches. To add a new outlet, it is necessary only to tap through the floor into the Q-Floor cell and install the floor outlet.

Want more information on General Electric Q-Floor Wiring? Write on your letterhead for a free copy of the *Q-Floor Wiring Data Manual*—address Section C7-518, General Electric Company, Bridgeport 2, Connecticut.

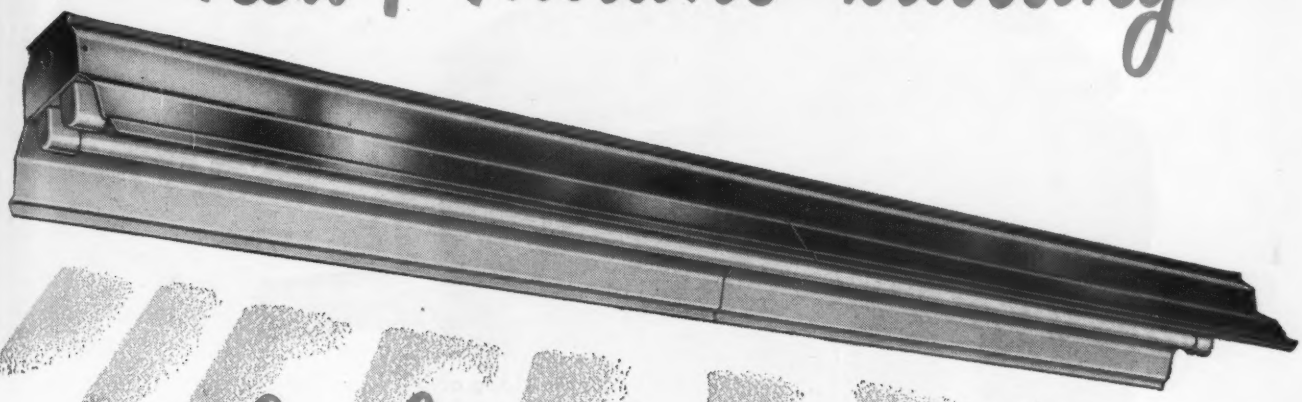
Q-Floor is manufactured only by the H. H. Robertson Company, Pittsburgh, Pa. Samples can be seen at any General Electric Construction Materials office or Robertson District Office.

Q-Floor Wiring

FOR ELECTRICAL FLEXIBILITY

GENERAL ELECTRIC

New! Instant-starting



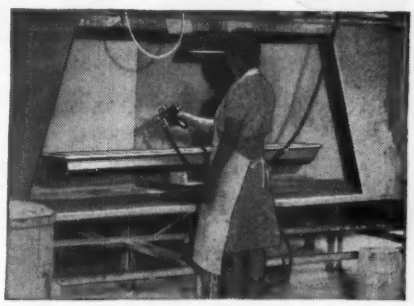
slimline fixtures

with wiring channels as well as reflectors available in Vitreous Porcelain Enamel

● Take a look at Wheeler Slimline Fixtures and you'll see the extra advantages that assure lowest cost in the long run. In addition to the benefits of instant-starting, you get the advantages of Wheeler "Skılled Lighting" design and construction . . . stable reflecting characteristics, easy cleaning, lower maintenance and extra-long service life. These inherent Wheeler features are the results of nearly 70 years of making quality lighting equipment.

Typical of Wheeler engineering thoroughness in Slimline Units is the exclusive auxiliary lamp support at center of fixture to prevent vibration of the 8-foot lamps. Fixture channel is in one sturdy piece . . . available in either baked enamel or porcelain enamel finish. Reflectors are in vitreous porcelain enamel finish only.

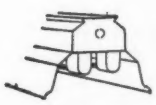
Two types of Slimline fixtures represent another Wheeler "Skilled Lighting" refinement. Each is designed for specific applications. Get all the facts on these latest products of Wheeler "Skilled Lighting". Write to **Wheeler Reflector Company, 275 Congress St., Boston 10, Massachusetts.**



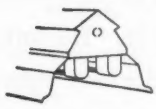
NEARLY 70 YEARS OF "Skilled Lighting" Tradition

Here is one of Wheeler's many veteran workers . . . skillfully applying Wheeler's famous wear-resistant vitreous porcelain enamel surface to the inside of a reflector. Through her faithful adherence to high quality standards, she helps to maintain the distinguished Wheeler tradition of top value in modern industrial lighting.

See all our new 1949 units at Booth Nos. 63 and 64 at the International Lighting Exposition.



Industrial Slimline Unit End view of Industrial Type unit showing flat top. These units are designed for general industrial use under normal atmospheric conditions.



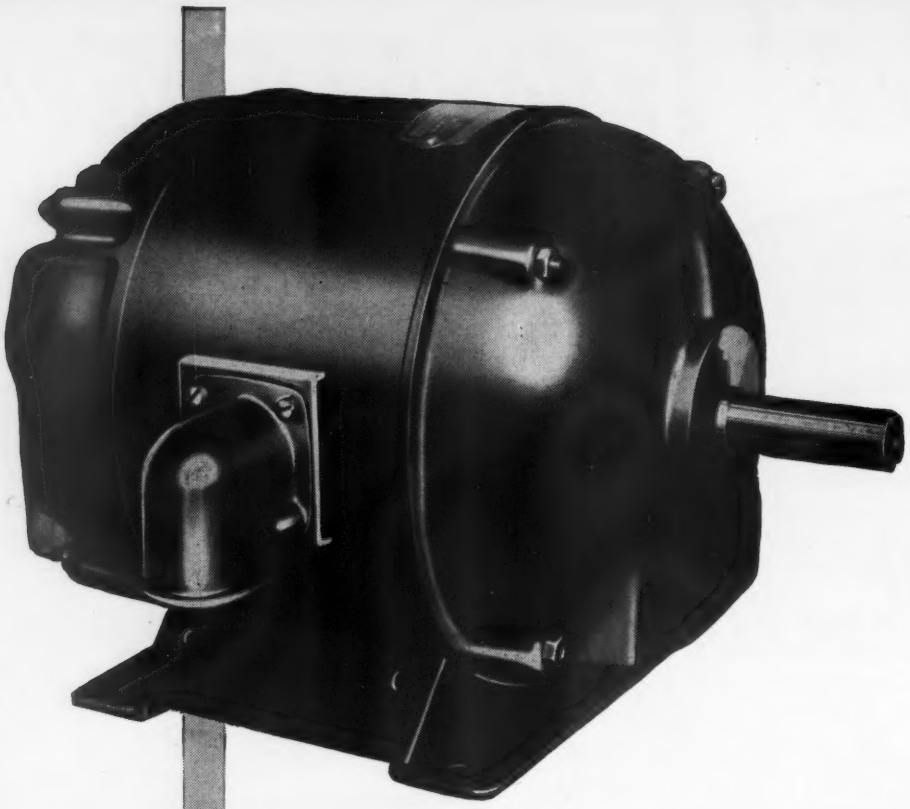
Textile Slimline Unit End view of Textile Type unit showing peaked top especially designed to eliminate frequent cleanings and danger of moisture damage.

Distributed Exclusively through Electrical Wholesalers

Wheeler REFLECTORS

SKILLED LIGHTING

MADE BY SPECIALISTS IN LIGHTING EQUIPMENT SINCE 1881



PROTECTED!

(INSIDE AND OUT)

Robbins & Myers Uni-Shell Motors, made with protected end-heads, are protected *inside and out* —from wind and weather; from overheating; from need for frequent attention. Extra-wide, sealed ball bearings require lubricating only *every five years.* Cooling air circulates through the rotor as well as between windings and shell. Made drip-proof, splash-proof, or totally enclosed in all motor types with *identical* mounting dimensions. Sizes to 30 h.p. Here's protected, dependable motor performance. Be sure you get it! *Prompt shipments.* Write for literature.

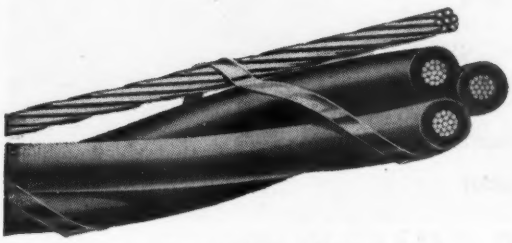
R & M *Uni-Shell* MOTORS

Authorized Distributors from Coast to Coast

ROBBINS & MYERS, INC., *Motor Division,* SPRINGFIELD 99, OHIO

FOR OVERHEAD SERVICE LINES
THAT GO UP FAST
PREVENT LINE TROUBLE
KEEP COSTS DOWN
HAZARD SELF-SUPPORTING AERIAL CABLE
install this pre-assembled cable, messenger and binder ALL IN ONE OPERATION

• Multi-conductor Self-Supporting Aerial Cable for signal and control circuits. Varied insulation colors provide quick circuit identification.



• Three-conductor Self-Supporting Aerial Cable. Hazaprene protective jacket on each conductor makes splicing and terminating simple and fast.

ALUMINUM CONDUCTORS

• Hazard Self-Supporting Aerial Cable available with Aluminum Conductors. Ask your Hazard representative or write us for the facts about lightweight conductors for overhead service.

Where overhead service with insulated cable is indicated, Hazard offers you this simple, self-supporting cable construction that makes installation quick, easy and economical . . . that provides ample protection against tree branches and rough weather . . . that assures lasting, trouble-free, low-cost circuits.

With Hazard Self-Supporting Aerial Cable, specially compounded Submarine rubber insulation provides long-lived, moisture-resisting, electrical protection for the Hazaloy coated copper conductors. Over this insulation goes a tough Hazaprene jacket that's well known for its unusual resistance to sun, cold, moisture, abrasion.

Bound to the cable by a spirally wound metallic tape, a strong Copperweld messenger gives full support between points of suspension. This simple, but effective *all-in-one construction* (cable, messenger, binder) of Hazard Self-Supporting Aerial Cable provides the ideal answer to the problems of installing and maintaining overhead circuits. For more information, ask your Hazard representative or write Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pennsylvania.

6403

HAZARD

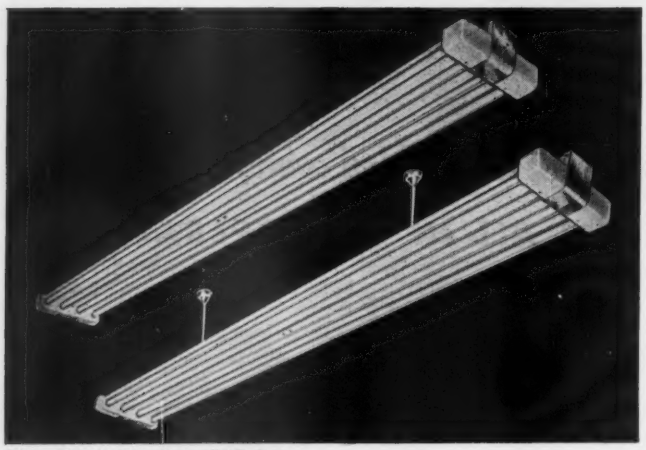
insulated wires and cables for every electrical use

Wm. PENN FLUORESCENT LIGHT MFRS.

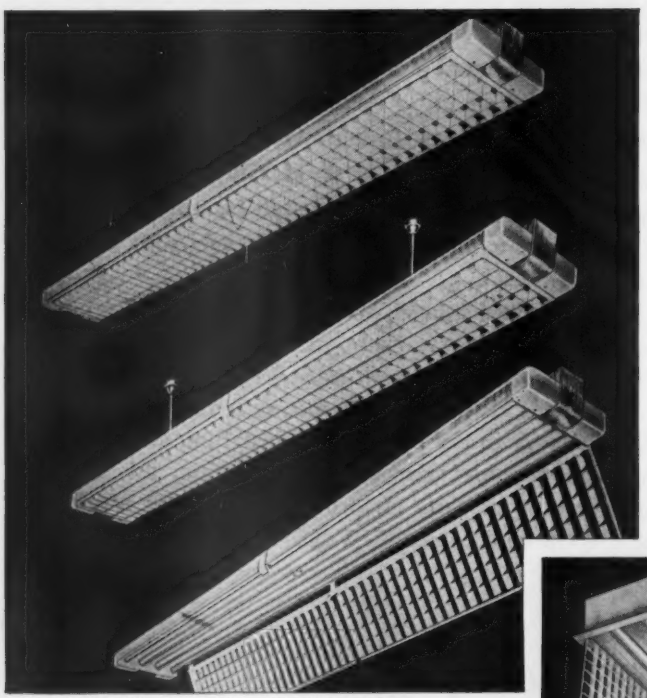
1639 SOUTH BROAD STREET • PHILADELPHIA 48 • PA.

Newest additions to attractive line of
commercial & industrial fluorescents

SLIMLINE fixtures that will delight your customers on looks, performance and price. Instant light without starters. Flush and pendant mounting, for single or continuous row. 2 and 4 tubes. Length 96". 100, 200, 300 MA. Simplicity of construction makes installation and service easy. Straight metal perforated sides and stamped metal ends, white enameled, with bright-metal trim.



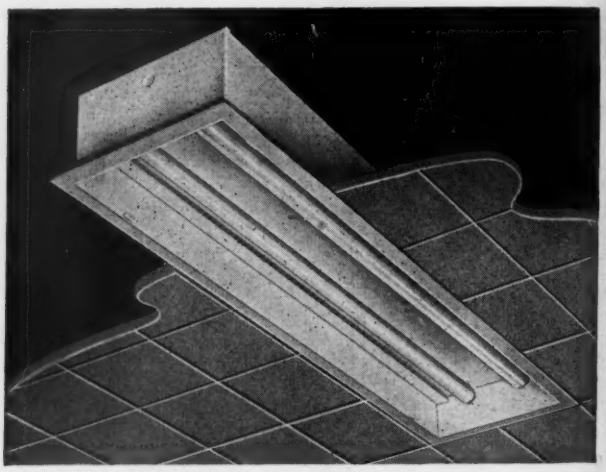
Wm. PENN Slimline #97 Open



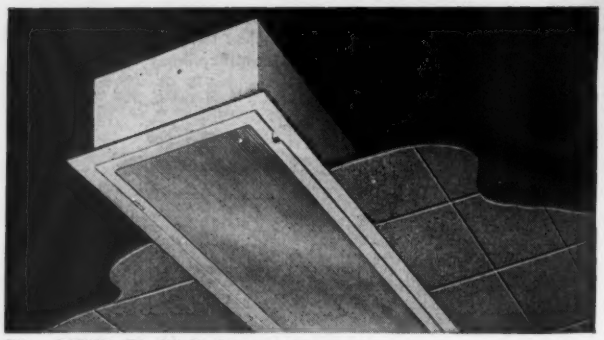
Wm. PENN Slimline #97 with Hinged Louvre

Sold through Wholesalers

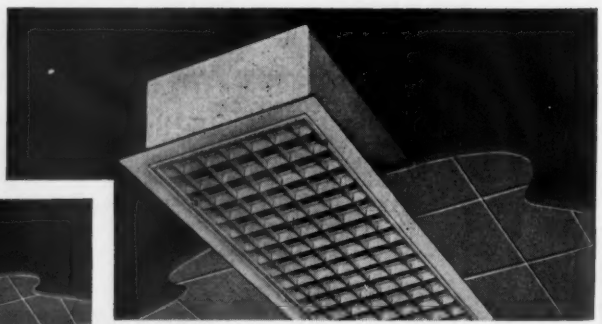
RECESS units that are most adaptable, efficient and economical. Beautifully designed for 2, 3 and 4 tubes (40-watt), single or continuous mounting. These are your fixtures for recessed lighting.

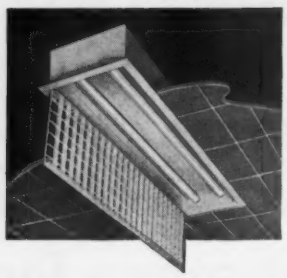


Wm. PENN #2-48 R. O. T. (Also 3 & 4 tubes)
Open-type troffer for direct, high-intensity lighting.



Wm. PENN #2-48 R. G. (2 tubes only)
Good looking unit with hinged shield of Pentacor glass.
Efficient delivery of diffused light.



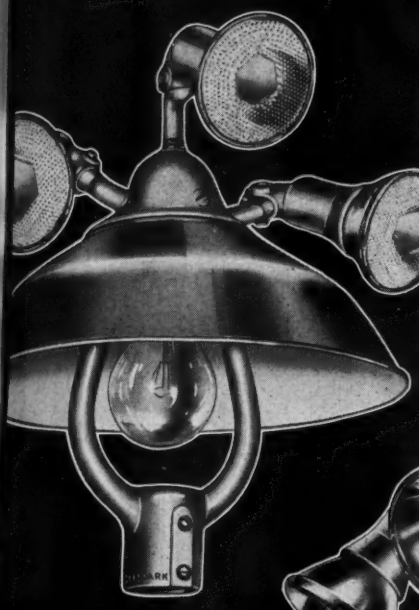


Wm. PENN #2-48 R. L. (Also 3 & 4 tubes)
For shadowless light in schools, offices, drafting rooms, etc., this unit has an attractive louvre that drops down for convenient cleaning and servicing.

Write for Catalog of complete Wm. PENN line

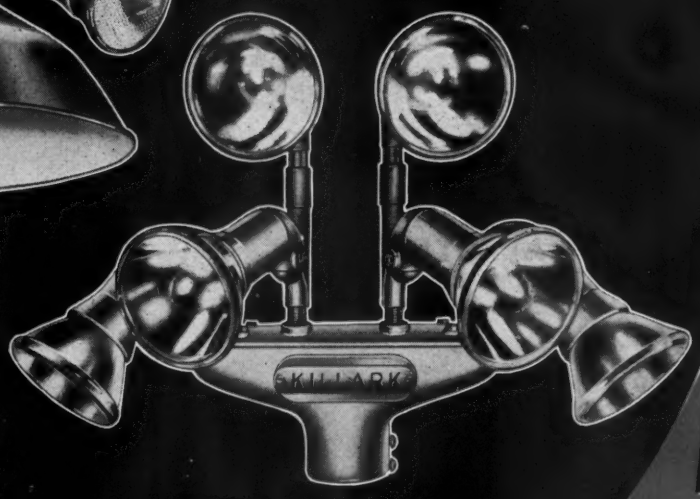
BUSINESS IS BETTER with

Can be directed at any angle.
Can be adjusted up or down.



TYPE SMHU

With 1 to 6 lamps. Can be used with your present island light set-up.



TYPE SYL

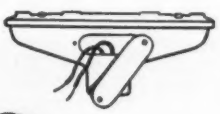
Available with 2 to 6 lamps.

KILLARK CLUSTER LIGHTS

Better Lighting . . . Easy Installation!

"Tailored" to give efficient and economical lighting for every need, Killark Cluster Lights offer all these PLUS features — that add up to better lighting for your customers — better business for you!

+ Special sealed beam lamps in all fixtures.
+ Each lamp is adjustable, to give light where it's needed most.
+ Uses *medium base* 150 and 350 watt lamps and *mogul base* 300 and 500 watt lamps.
+ Rustless aluminum construction, for dependable service.
+ Weatherproof — sealed against dirt, dust and moisture.
+ Low maintenance cost — no reflectors to paint or wash.



Trough large size. Front (gasketed) cover for easy splicing and wiring.

From single Killark Sealed Beam flood or spot lamps to six lamp Cluster Lights, Killark offers a unit for every need. Furnished completely wired for simple, fast installation.

Write for illustrated bulletin and information on the complete Killark line.

KILLARK ST. LOUIS

Killark

ELECTRIC MANUFACTURING COMPANY

Offices and Warehouses: Atlanta, Boston, Chicago, Denver, Los Angeles, Pittsburgh, San Francisco, Seattle, Syracuse.

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SAINT LOUIS 13, MO.

BE WISE...

USE NONMETALLIC-SHEATHED BUILDING CABLE THAT UTILIZES FIBERGLAS* YARN

For permanence—for customer satisfaction—you'll find it's wise because Fiberglas Yarn:

- WON'T ROT
- WON'T ABSORB MOISTURE
- WON'T BURN

  WON'T PROVIDE FOOD FOR RODENTS

  POSSESSES THE INHERENT CORROSION RESISTANCE OF GLASS
- PROVIDES THE CABLE WITH HIGH TENSILE AND IMPACT STRENGTH

For your satisfaction, too, you'll find it's wise, because it gives you a cable that will:

- PULL EASILY
- OFFER LONGER LIFE

Use it on your residential, farm, commercial or industrial wiring jobs. Nonmetallic-sheathed building cable incorporating Fiberglas Yarns is made by leading Wire and Cable manufacturers . . . sold by leading Electrical Wholesalers. Owens-Corning Fiberglas Corp., Textile Products Division, 16 E. 56th St., New York 22, N.Y.

In Canada: Fiberglas Canada Ltd., Toronto, Ontario

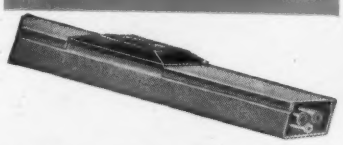
*FIBERGLAS is the trade-mark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation for a variety of products made of or with glass fibers.

OWENS-CORNING FIBERGLAS *Yarns*

BUILDING WIRE, TOO, offers the same advantages when Fiberglas Yarn is utilized.

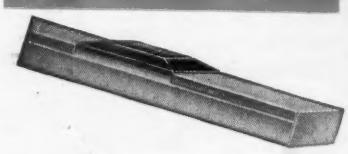
You can PLUGMOLD this room by 3 methods

unwired PLUGMOLD



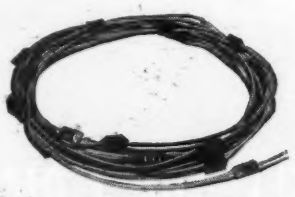
Provides complete flexibility. Wiring is done on the job . . . outlets may be placed where needed . . . easily added or relocated. *Approved with devices* in place for three No. 12 or No. 14 conductors.

wired PLUGMOLD



Factory-wired, ready to install. Available in 3-foot lengths, 6 outlets on 6-inch centers . . . 6-foot lengths, 4 outlets on 18-inch centers.

SNAPICOIL



Outlet convenience by the yard! Coils of prewired receptacles, ready for quick installation. Available in four popular lengths, with brown or ivory receptacles.

When you plan electrical outlet convenience — in homes, offices and stores — look into the time-saving, business-building opportunities of the PLUGMOLD *trio*.

Interconnectable, three PLUGMOLD wiring methods are available with a wide range of factory-wired outlet spacings (or wiring may be done on the job, outlets placed exactly where needed) . . . *flexibility* to meet the specific requirements of every installation. A minimum number of well-designed fittings means savings in time and trouble.

And regardless of the PLUGMOLD method you select, you're assured of the same results . . . an installation that's neat, trim in appearance . . . outlet convenience that always has customer approval.

Important *reasons why* it will pay you to plan PLUGMOLD. For the complete facts, write today . . .

THE WIREMOLD COMPANY
HARTFORD 10, CONN.

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WITH PITTSBURGH PERMAFLECTOR LIGHTING EQUIPMENT

Maintain your creative freedom with Pittsburgh Permaflector Lighting Equipment . . . the line made in modules of related units that may be combined to form the design patterns, illuminating effects and foot-candle levels required to do an outstanding job. "Standard" Pittsburgh Permaflector Fluorescent and Incandescent Units give "the light you want where you want it" efficiently and economically.

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"Pittsburgh" Permaflector

FOR MORE KNOW-HOW ON "CUSTOM LIGHTING" WITH STANDARD EQUIPMENT

Write for Catalogs 48 and 46 which give application ideas, descriptions, specifications and other data about flexible Pittsburgh Permaflector Lighting Equipment.

PITTSBURGH REFLECTOR COMPANY

404 OLIVER BUILDING • PITTSBURGH 22, PENNSYLVANIA

MANUFACTURERS OF FLUORESCENT & INCANDESCENT LIGHTING EQUIPMENT

Permaflector Lighting Engineers in All Principal Cities

PITTSBURGH PERMAFLECTOR LIGHTING EQUIPMENT IS DISTRIBUTED BY BETTER ELECTRICAL WHOLESALERS EVERYWHERE

American MOTOR LEADS

are insulated and protected with NATVAR 400

The compact 1 HP single phase 115/230 volt, capacitor start—induction run motor, manufactured by American Electric Motors, Inc., Los Angeles, is especially recommended for use around dirt or dust-filled machines such as table saws or other woodworking tools. The centrifugal starting switch is totally enclosed, and the solid welded copper bar armature is mounted on high quality, standard size ball bearings, lubricated for life. Leads are insulated and protected with Natvar 400.

American Electric Motors, Inc., Los Angeles, manufactures a line of induction motors, both single phase and polyphase, and a line of grinders and buffers. An excellent indication of their performance and value is the fact that they are widely distributed by a principal mail order chain.

Natvar 400 Extruded Vinyl Tubing is used on motor leads, because it is approved for 105°C continuous operating temperatures, it simplifies assembly, and gives better all around insulation and protection with considerable savings in labor and material costs and reduced waste.

Natvar 400, in addition to its ability to withstand heat, also has uniformly superior resistance to oil. It is available for prompt delivery either from a nearby wholesaler's stock or direct from our own. Full Underwriters' Laboratories report on request.

Natvar

Natvar Products

- Varnished cambric—straight cut and bias
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- Varnished special rayon
- Varnished Fiberglas cloth
- Silicone coated Fiberglas
- Varnished papers
- Slot insulation
- Varnished tubings and sleevings
- Varnished identification markers
- Lacquered tubings and sleevings
- Extruded vinyl tubing and tape
- Extruded vinyl identification markers

Ask for Catalog No. 21

THE NATIONAL VARNISHED PRODUCTS Corporation

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CABLE ADDRESS
NATVAR: RAHWAY, N. J.

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Now Available!

A GENERAL-PURPOSE* INSULATING VARNISH

G.E.'S NEW 9574

Now you can get a high-quality varnish for every type of winding except extra-high-speed armatures—General Electric's new general-purpose insulating varnish G-E 9574. Particularly easy to work with, G-E 9574 can be used at barrel gravity or reduced up to 20% with ordinary petroleum spirits. This clear varnish bakes and cures at temperatures as low as 212 F in conventional baking equipment. It easily penetrates the deepest coils, forming an even film. Its aging properties are excellent.

CHECK THESE CHARACTERISTICS

OUTSTANDING
Mechanical Strength

Build relative	Excellent
Adhesion	Excellent
Toughness	Excellent
Hardness	Excellent
Flexibility	Excellent
Penetration	Excellent
Bonding	Excellent
High-temp. bonding	Excellent

UNUSUAL
Chemical Resistance

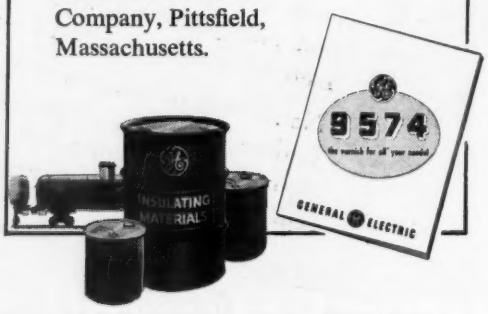
Water	Excellent
Acid	Excellent
Alkali	Excellent
Oil	Excellent
Salt water	Excellent

EXCELLENT
Electrical Properties

Dielectric strength, volts/mil	1800-2000
Dielectric strength, after 24 hours' immersion in water at 25 C, volts/mil	700

**G-E 9574 gives excellent results on all types of coils except extra-high-speed armatures. It is one of G.E.'s complete line of electrical insulating materials.*

FOR MORE DETAILS,
write for new bulletin to your local G-E Distributor or to Section 22-5, Chemical Department, General Electric Company, Pittsfield, Massachusetts.



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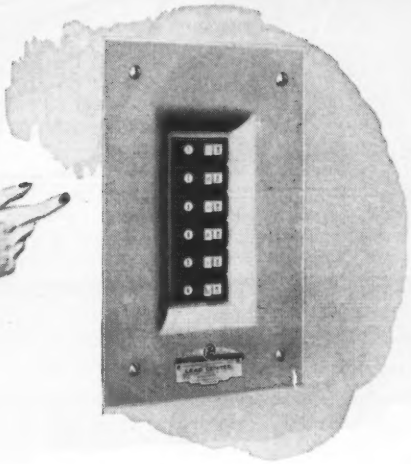
GENERAL ELECTRIC

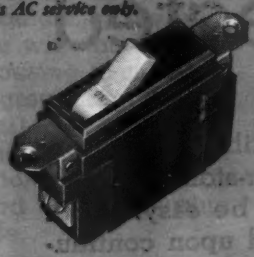
CD49-M4

the modern "fuse box" is now...

FUSELESS ! SHOCKPROOF ! AUTOMATIC !



Ⓕ THERMAL-MAGNETIC CIRCUIT BREAKER
For use in load centers up to 16 single poles or a combination of single and double poles totaling 16 poles maximum. Capacities: 15-20-30-40-50 amps.; for 120 and 120/240 volts AC service only.



Ⓕ TYPE A C JUNIOR CIRCUIT BREAKER
Automatic thermal trip for use in load centers, 6 circuits or less. Also for oil burner or stoker protection . . . or where smaller capacity circuit breakers are desired. Capacities: 10-15-20-30 amps.; 120 volts, AC service only, single pole.

THAT'S RIGHT! When short circuits or *dangerous* overloads occur, the Thermal-Magnetic action of the Ⓕ THERMAG Circuit Breaker Load Center instantly and *automatically* opens the circuit and trips the circuit breaker handle to "off" position. Then, safely and conveniently, a simple flip of the handle to "on" position restores the circuit to normal operation. And there is nothing to replace!

On harmless momentary overload, the *thermal* action of the individual circuit breaker maintains the circuit without needless interruption of service.

In cases of smaller capacity requirements, the new Ⓕ JUNIOR Circuit Breaker Load Center provides *automatic* protection for small residences, garages, stores, etc.

For more information, consult your Ⓕ Representative (he's listed in Sweet's) or write for Bulletins No. 202 and 203.

Frank Adam Electric Co.

ST. LOUIS 13, MISSOURI

Makers of BUSDUCT • PANELBOARDS • SWITCHBOARDS • SERVICE EQUIPMENT • SAFETY SWITCHES • LOAD CENTERS • QUIKHETER

You have been elected

IT is time to recognize anew the obligations of leadership--the reponsibility that attends your place in the business life of the community.

That there are influences at work right now--every day--attempting to disrupt and destroy the American way of life--has been plainly demonstrated. These forces, disguised though they be, are more active - more determined - more dangerous than ever before.

To save individual liberty and personal freedom--corner-stones of our civilization--may not be easy. As a leader you are called upon continuously to help form and direct a militant public opinion. Only by the united, vigilant efforts of all citizens of good will, those who cherish our principles of government and our ideals, will we maintain our invaluable heritage of liberty, justice and freedom.

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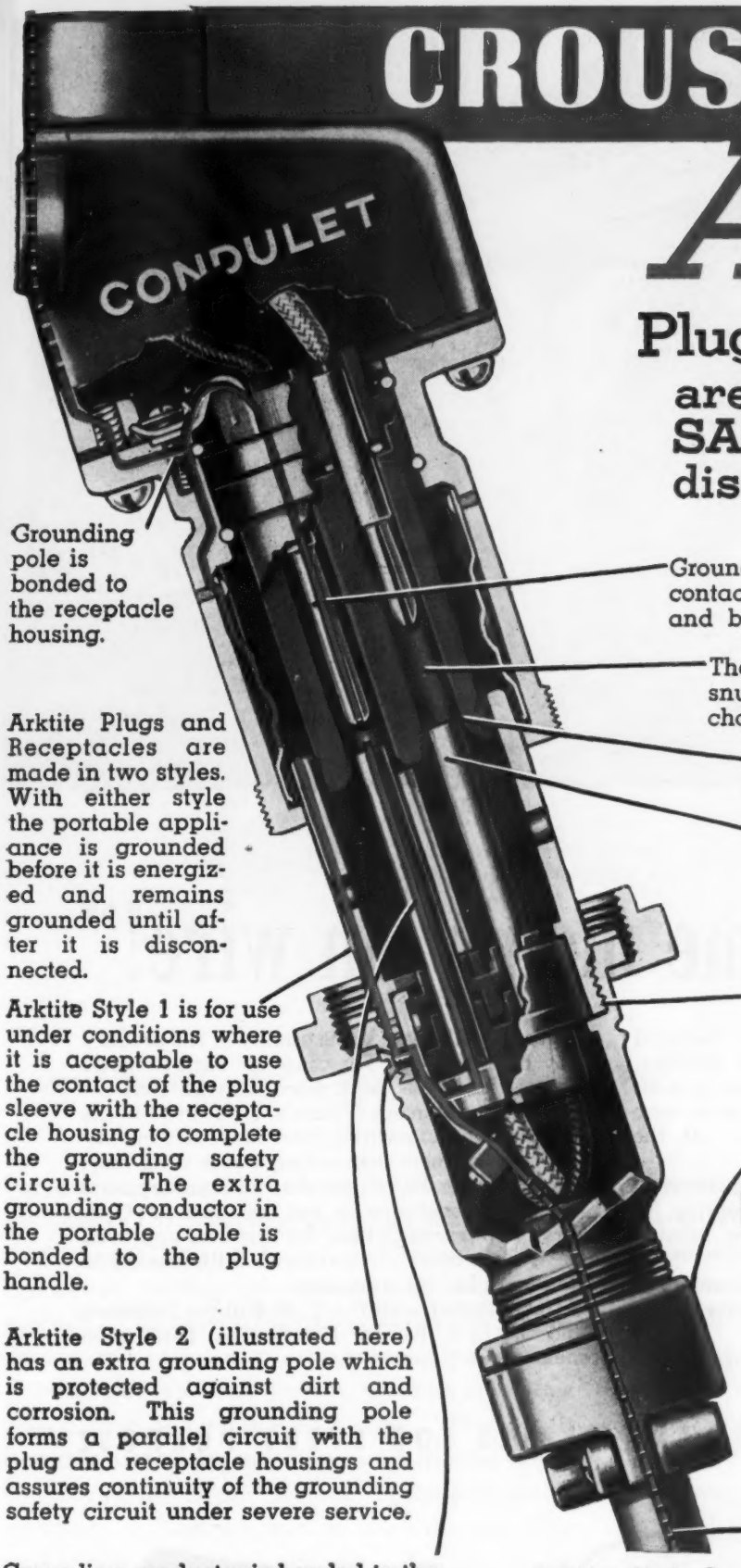
MANUFACTURERS OF CARBON, ALLOY AND YOLOY STEELS

ELECTROLYTIC TIN PLATE - COKE TIN PLATE - WIRE - COLD FINISHED CARBON AND ALLOY BARS - PIPE AND TUBULAR PRODUCTS - CONDUIT - RODS - SHEETS - PLATES - BARS - RAILROAD TRACK SPIKES.

CROUSE-HINDS

Arktite

Plugs and Receptacles are circuit breaking and SAFE without additional disconnect equipment.



Grounding pole is bonded to the receptacle housing.

Arktite Plugs and Receptacles are made in two styles. With either style the portable appliance is grounded before it is energized and remains grounded until after it is disconnected.

Arktite Style 1 is for use under conditions where it is acceptable to use the contact of the plug sleeve with the receptacle housing to complete the grounding safety circuit. The extra grounding conductor in the portable cable is bonded to the plug handle.

Arktite Style 2 (illustrated here) has an extra grounding pole which is protected against dirt and corrosion. This grounding pole forms a parallel circuit with the plug and receptacle housings and assures continuity of the grounding safety circuit under severe service.

Grounding conductor is bonded to the plug handle.

Grounding pole is longer than the others so contact in the grounding circuit is made first and broken last.

The arc formed by pulling the plug is instantly snuffed in the confined insulated arcing chamber.

Each plug contact fits closely the opening of its individual arcing chamber.

The arc is broken while the plug contact is still a considerable distance inside of the arcing chamber. There is no danger of the arc traveling over to the other side of the circuit or to the housing.

Two-piece plug is easy to take apart and reassemble.

Direct-pressure clamp insures postive grip on the conductor cable.

Arktite Style 2. Sectional View

The green line indicates the grounding safety circuit.

CROUSE-HINDS offers the only complete line of circuit breaking plugs and receptacles—20 Amp. to 400 Amp., 250 volt D.C., 600 volt A.C.

Complete listings are in the Condulet Catalog.

A Nationwide Distribution Through Electrical Wholesalers

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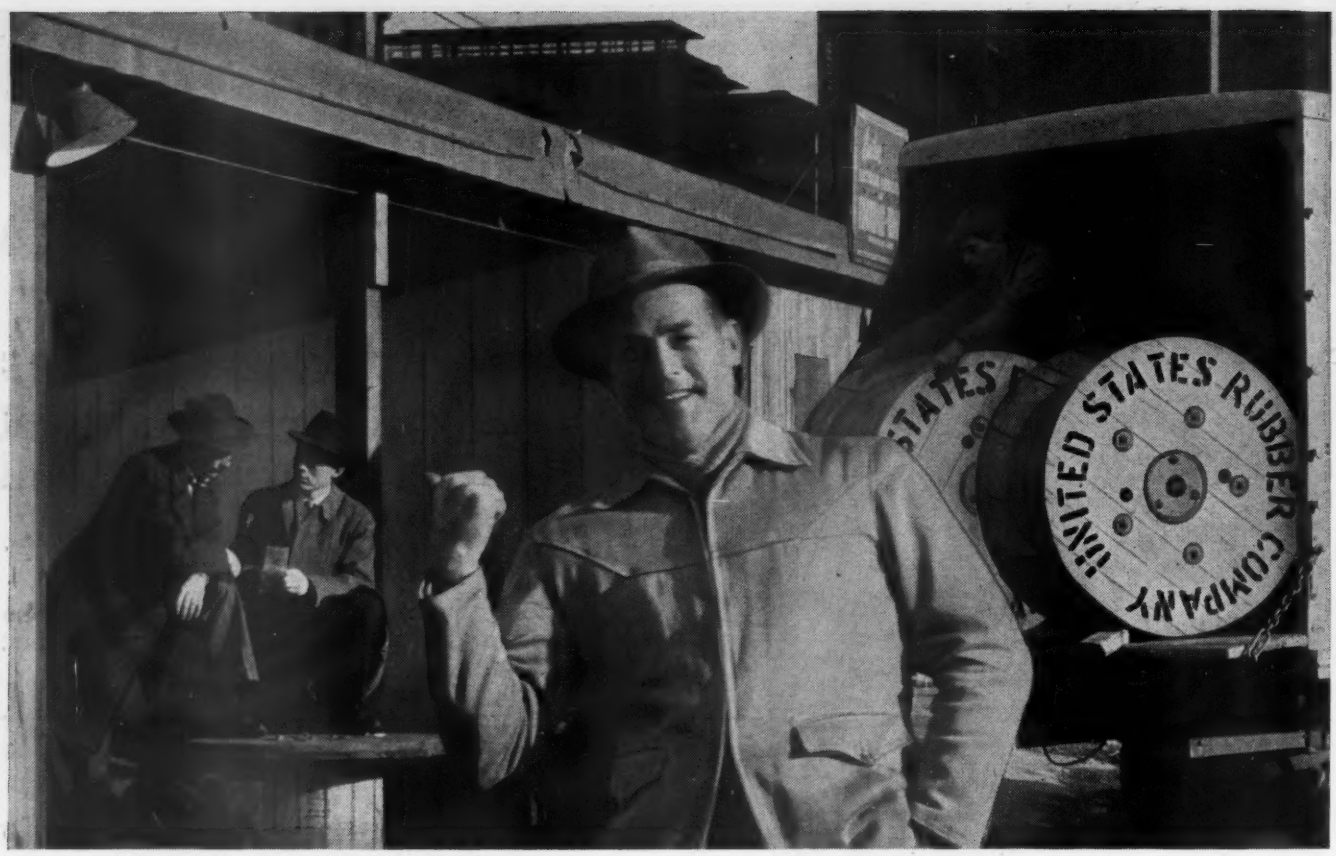

"This Pair saved me money on wire!"

That's the kind of talk you hear from an electrical contractor—when he deals with U. S. Rubber.

For the U. S. Rubber salesman teams up with the U. S. Distributor's salesman—to make sure you get the *right* kind of product . . . at the *right* time.

Your crews won't stand idle awaiting electrical wire shipments, when this team is working for you. They'll get you the stuff on time, because they have it stocked close to you.

And if you have an extra rush-rush order, or one that's hard to fill, you'll be surprised how quickly they can deliver it.

But the most important money-saving function of this "U. S." team is the quality of the product they bring to you. They provide such items as U. S. Laytex, the small diameter wire that enables you to take out 6 wires and put in 11 in the same conduit on rewiring jobs. This extra quality wire costs no more than ordinary code wire. Then there's Laytex RUW, the wire with unsurpassed insulation resistance in wet locations . . . U. S. Service Entrance Cables, the first ever approved by Underwriters' Laboratories with Neoprene cover and Laytex insulation.

Get together with the U. S. Rubber Salesman and the U. S. Rubber Distributor. You'll save money, every time.

U. S. ELECTRICAL WIRES AND CABLES FOR EVERY PURPOSE

The electrical wholesaler performs an indispensable function in distributing electrical products. He keeps inventories, provides billing, credit and other services—each of which reduces the cost of the electrical product to the contractor.

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UNITED STATES RUBBER COMPANY

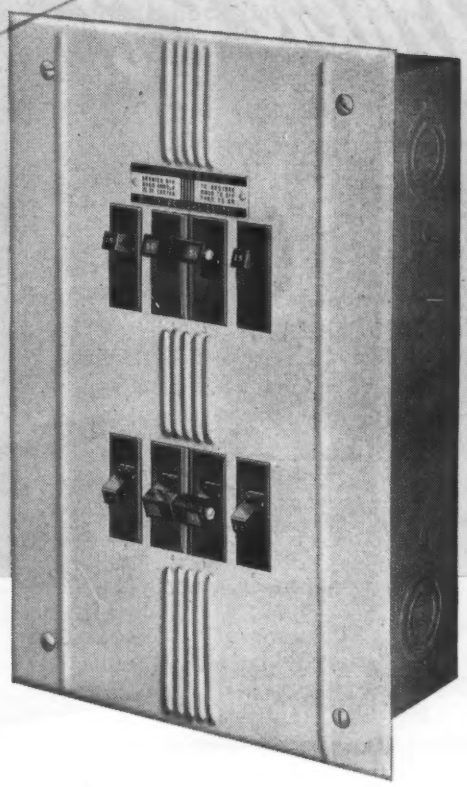
1230 Avenue Of The Americas, New York 20, N. Y.

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

Quicklags *CLICK* with everyone!

If the lights go out... a flip of the switch restores service. As convenient as that! No fuses to replace... and so simple and safe that even a child can operate it.



and here's why they'll CLICK with you

Everyone is enthusiastic about the new Quicklag Loadcenter. That's because Quicklags add a modern touch of quality to any home . . . combine years of dependable wiring protection with real convenience . . . and make it easy for you to sell a more adequate wiring job to prospects and homeowners.

You stock a few basic devices, breakers of various ratings, flush and surface-type covers. That is all. With this basic equipment you can tailor the Loadcenter to fit the circuit protective requirements of any home . . . and you can do it on the job. The breaker pan lifts completely out to provide plenty of wiring room and the breakers simply snap into place. What's more, the spring-backed breaker pan automatically adjusts the breaker assembly up to the cover.

See the new Quicklag Loadcenter at your nearest Westinghouse supply house, or write for Booklet B-3881. Address Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-60666-A

Westinghouse

QUICKLAG LOADCENTERS

LIGHTNING can and does strike at unpredictable times and places. When it does, protection to life and property and the correct functioning of electrical equipment depend largely on suitable and permanent ground connections—connections that are maintained in a condition to perform the service for which they were designed and installed.

Make sure that your grounds have adequately-low resistance through the periodic use of a "Megger*" Ground Tester. Available in two models, these instruments measure resistance to earth of ground connections quickly, easily and accurately.

THE HEAVY DUTY "MEGGER" TYPE—built for ruggedness and durability—housed in a teakwood case. Has proportionately divided scales from 0 to 1 ohm (reading in .01 ohm) to as high as 0 to 30,000 ohms, with three, four or five ranges in the same instrument.

THE "MEG" TYPE—smaller and lighter, weighing only 8 pounds—mounted in a cast aluminum case. Scales are logarithmic in character, so as to cover as wide a range as possible within the limits of practical field accuracy. Ranges are single or double up to 3,000 ohms.

For a complete description of "Megger" Ground Testers and the "hows" and "whys" of ground resistance measurement, we invite you to write NOW for Catalog 25-EC.

*REG. U. S. PAT. OFF.

JAMES G. BIDDLE CO.

Electrical & Scientific Instruments

1316 ARCH STREET, PHILADELPHIA 7, PA.

G-45-30-2-P

What does this

FLEUR-O-LIER INDEX SYSTEM NUMBER MEAN?

In a specification, it denotes the exact kind of lighting performance desired. "G" stands for General Diffuse lighting distribution; "45" for 45° side shielding; "30" for 30° end shielding; "2" for a brightness in shielded zone of not more than 2½ footcandles per square inch; "P" means Pendent mounting.

For a fixture, those symbols mean that Electrical Testing Laboratories, Inc., after photometric tests, find it has those performance characteristics.

Thus, it is now possible for the specifier to express simply and precisely the lighting performance he wants. And the buyer can now buy fixtures and know in advance how they will perform when installed. For, in addition to the Index System rating, complete photometric data, together with coefficients of utilization are supplied for each Fleur-O-Lier fixture,

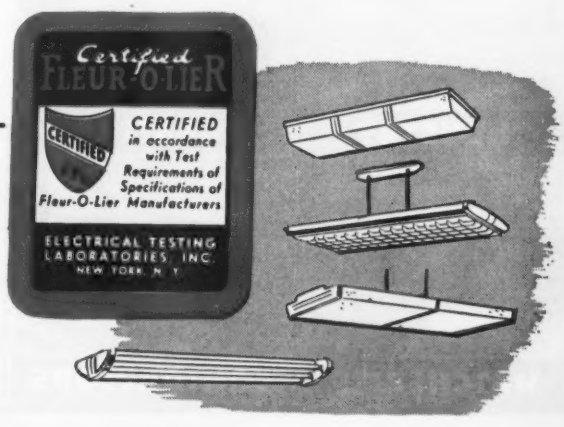
And the Fleur-O-lier label certifies that the fixture is "right" mechanically and electrically.

Fleur-O-Lier Gives *Complete* Information —

All the data needed to make an intelligent choice of fixtures is provided by Fleur-O-Lier. You get—

1. An Index System Rating
2. Photometric test data
3. Coefficients of Utilization
4. Certification

You're *sure* when you insist on Fleur-O-Lier. •



FLEUR·O·LIER

Manufacturers

2116 Keith Building • Cleveland 15, Ohio

Fleur-O-Lier is not the name of an individual manufacturer, but of a group of fixtures made by leading manufacturers. Participation in the Fleur-O-Lier program is open to any manufacturer who complies with Fleur-O-Lier requirements.

World's Largest Builder of Electric Plants . . .

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A GREAT NEW PROFIT OPPORTUNITY FOR CONTRACTOR DEALERS

POWER & LIGHT FOR EVERY NEED
Onan
PRODUCTS

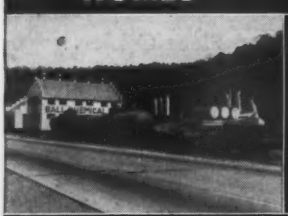
A few of the many uses for ONAN ELECTRIC PLANTS

FARMS

RESORTS

HOMES

HOSPITALS



INDUSTRY

THEATERS

HATCHERIES

CONTRACTORS

Being an electrical contractor-dealer places you in position to increase your volume of business by becoming a dealer for Onan Electric Plants.

The tie-up is a natural. When you sell an Onan Electric Plant you have every advantage over competition in getting the wiring job, selling the fixtures and accessories . . . making the complete installation. On the other hand, in your regular line of electrical work, you make contacts with customers who need electric plants for portable, standby or stationary use.

Operating in this way, contractor-dealers throughout the country are making substantial profits on Onan Plants.

Onan Electric Plants are superior in design, construction, performance and value. Their reputation in the field will make your selling job easier.

The market for electric plants is broad. Onan units are used for over a hundred different applications. You are in the best position to profit by this demand. Write today for details of the new Onan Sales Plan.

ONAN ELECTRIC PLANTS—A.C.: 350 to 35,000 watts in standard voltages and frequencies. D.C.: 1200 to 15,000 watts, standard voltages. Battery Chargers: 300 to 2,000 watts, 12, 24 and 32 volts. Diesel and gasoline-powered models.

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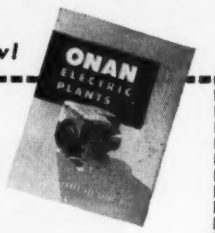
Send Today! *Arrange for your territory now!*



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Send details of your new Sales Plan and Complete Catalog of Electric Plants today!

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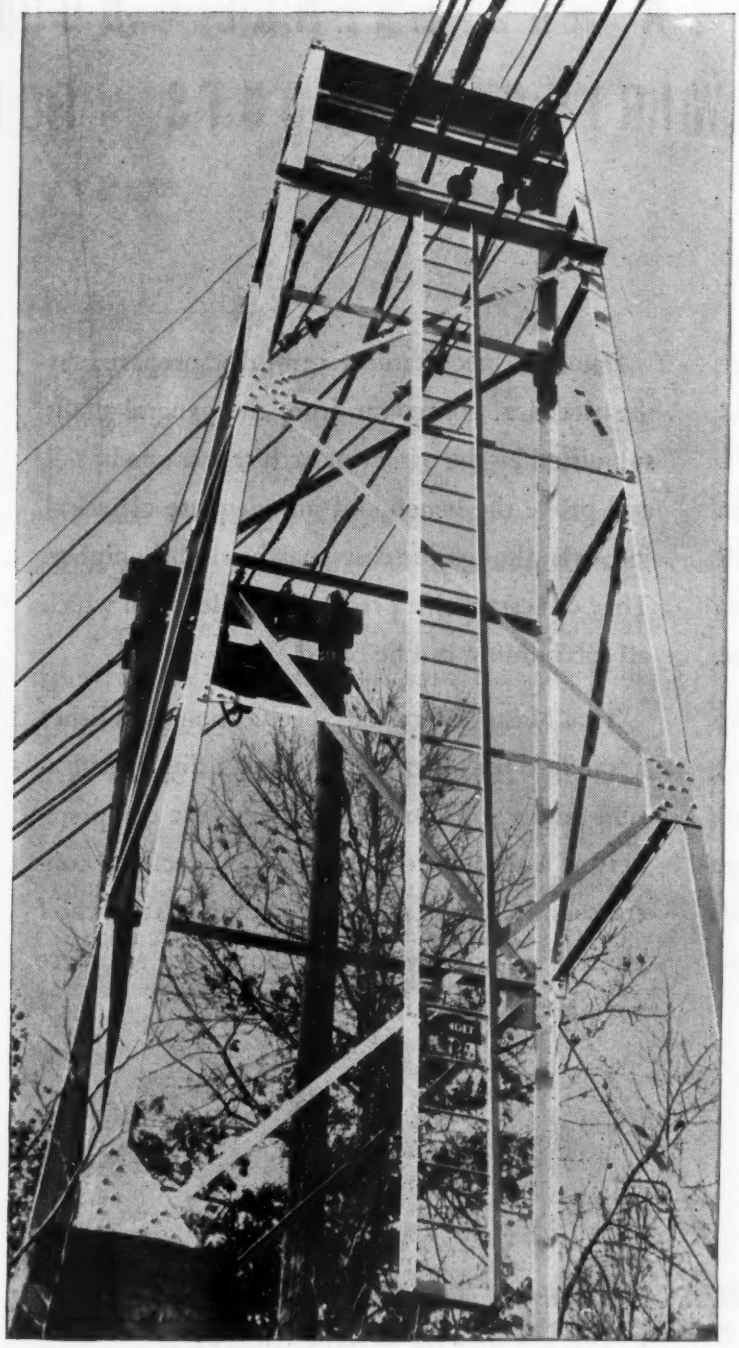
MORE DATA ON ALCOA EC ALUMINUM

Lighter weight, lower cost . . . on the job today



Q ***How does ALUMINUM compare on tensile and breaking strength?***

Tensile strength of ALUMINUM conductor is higher than copper wire for comparable duty.

Insulated wire and cable made with Alcoa E.C.* Aluminum is specified two AWG sizes larger than copper if same voltage drop or power loss is desired. If specified for same carrying capacity (temperature rise) the aluminum conductor has approximately 36% larger cross section than copper. In both cases, the aluminum conductor is stronger. And the ratio of strength to weight is much greater. For example, aluminum can sustain at least twice the length of vertical riser permissible with copper conductors.

You get greater tensile breaking strength—you get lighter weight and lower costs—with wire and cable made with Alcoa E.C. Aluminum. Alcoa makes light, strong, conductive E.C. Aluminum; leading wire manufacturers draw, strand and insulate it, and sell it under their own trade marks. Ask your wire supplier about it, or write ALUMINUM COMPANY OF AMERICA, 2197 Gulf Building, Pittsburgh 19, Pennsylvania.

*E.C.: *Electrical Conductor* Aluminum

◀ MOSINEE PAPER COMPANY

1,500,000 cm T.B.W.P. all-aluminum cable river-crossing span 800 ft. long. Three aluminum cables, two iron shield wires above and an additional circuit of 400,000 cm copper underneath. Installed in 1914. Carries load up to 1000 amperes. A double circuit of 400,000 cm copper is paralleled and connected to the 1,500,000 cm aluminum cable by use of aluminum parallel groove clamps. Clamps are bare and have not been changed since installation in 1914.

ALCOA ALUMINUM

FOR ELECTRIC WIRE AND CABLE

. . . MASTER E

A REFERENCE BOOK OF

AND WIRING LAYOUTS FOR AL

ELECTRICAL Construction and Maintenance will publish in its July issue a revised and expanded 60-page feature on ELECTRICAL SPECIFICATIONS—how to plan and write them for every type of electrical wiring layout. It will be simply written and helpfully illustrated, so that material will be easy to understand and use.

With bidding on electrical work becoming more and more competitive, there is a need for writing tighter specifications, calling for a greater wiring adequacy. Adequate electrical systems using high quality materials and equipment can be the rule — not the exception — only when good, tight specifications are drawn.

Detailed specifications carefully prepared by the electrical contractor from the general plans submitted by the owner or architect can help sell and prove the benefits of an adequate electrical job, even though the costs may be slightly higher. They can establish a precise higher level on which all job bidding can be based.

This Master Electrical Specification establishes a standard for exact wording in writing specification paragraphs and for checking the completeness of a specification. It provides electrical contractors, architects, consulting engineers and chief electricians alike with an authoritative reference for planning all future installations.

DO YOU HAVE AN ARCHITECT OR CONSULTING ENGINEER TO WHOM YOU WOULD LIKE A COPY OF THIS SPECIAL ISSUE SENT? IF SO, SEND US HIS NAME AND ADDRESS, AND WE'LL SEE THAT HE RECEIVES A COPY WITHOUT ANY OBLIGATION TO YOU.

ELECTRICAL SPECIFICATION

OF SPECIFICATION PARAGRAPHS

ALL TYPES OF OCCUPANCIES

Each section will be written as specification paragraphs enabling you to prepare your own specifications by copying directly from this master reference. Numerous diagrams, charts and data sheets will be used throughout to explain details.

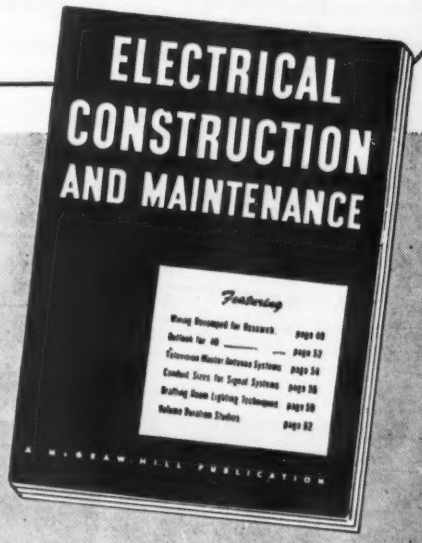
This reference together with the Electrical Construction Methods insert from the July 1948 issue will serve as a guide during two important steps in the construction of electrical systems.

Additional copies of this issue may be had for $1.00 each by writing directly to the Editor, Electrical Construction and Maintenance, 330 W. 42nd St., New York 18, N. Y.

MASTER ELECTRICAL SPECIFICATION —JULY, 1949

To aid you in planning all your future installations, each specification paragraph will be coded for easy reference, under the following general headings:

0.1	**Index**
0.2	**Introduction**
1.1	**General Conditions**
1.3	**Procedure**
2.1	**Service Entrance**
2.2	**Grounding**
3.1	**Substations and Vaults**
4.1	**Service Switches**
5.1	**Feeders**
5.2	**Bus Bar Distribution Systems**
5.3	**Underground Distribution Systems**
6.1	**Branch Circuits**
6.2	**Special Raceway Systems**
6.5	**Emergency and Auxiliary Wiring Systems**
7.1	**Signal and Communications**
8.1	**Lighting Components and Fixtures**
8.2	**Apparatus and Equipment**
9.1	**Data Tables**



SPECIAL PRODUCT INDEX

To help you find sources of supply when you are drawing up detailed specifications and referring to this Electrical Specification, Electrical Construction & Maintenance will include a Manufacturers' Product Index in this July issue. All products advertised will be listed under name of supplier and under general product headings.

CIRCUIT BREAKERS GIVE REPEAT PROTECTION

Nothing to Burn Out
Nothing to Replace

Use Square D's Thermal-Coilless Magnetic Circuit Breakers on ALL lighting and power circuits for these additional advantages:

Complete Protection • THERMAL element holds harmless momentary overloads but trips before wire insulation overheats on continuous overloads. MAGNETIC element trips quickly on shorts to localize damage.

Downtime Minimized • Nothing burns out. No live parts exposed. Can be quickly reset by ANYONE.

Non-Tamperable • Factory test-tripped and sealed. Guards against well-intentioned but dangerous home remedies.

Manual Switching • Simple mechanism is designed for long life under severe service. Contacts are capable of interrupting shorts.

More Wiring Space • Compact mechanism permits wide gutter space in SMALL enclosure.

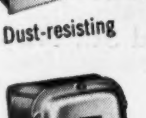
Full Line • Five frame sizes, many ratings and four enclosure types.

	AMPERE RANGE			
VOLTS	ML	ML 1	ML 2	ML 3	WL
250	15-50	70-100	—	125-225	225-600
600	—	15-50	70-100	125-225	225-600

An Enclosure for EVERY APPLICATION

Dust-resisting

Rain-tight


Weatherproof and Dust-tight

Explosion-resisting

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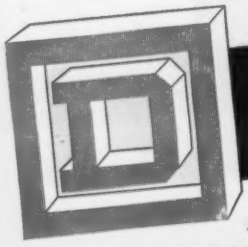

SQUARE D COMPANY

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MAY . . . . at a Glance

Better Residential Wiring

House wiring is a highly conservative business. We are slow to adopt changes, but the present course of utilization requires constantly expanding wiring capacities. In Adequate Wiring, we have the most important method of bringing residential wiring jobs to the capacity necessary for modern loads. Another useful technique is to build the wiring job by offering plus values, obvious improvements which have a direct sales appeal. "Plus Values in Residential Wiring," beginning on page 68, explores the market for residential wiring and lists a number of plus values which help to sell more and better residential wiring.

Merit Awards

In the recent erit Award Competition at the Third International Lighting Exposition, 3 Gold Seal Awards and 19 Merit Award Certificates were won by electrical contractors in a nationwide contest. The three planned lighting installations that finished in the money are illustrated and described in an article beginning on page 80 in this issue.

The keen interest of electrical contractors in the contest and in the lighting exposition and conferences was further evidenced by the large numbers who turned out for the show. They made up a large portion of the attendance, which totalled over 7,000. Our cameras caught a few of them around the show, and you'll find their pictures in "Contractors at the Lighting Show" on page 78.

Electrification Methods

While the materials and the basic technology of electrical work is readily applicable to the specific needs of many different industries, the requirements of individual plants are often keyed closely to certain particular processes of that industry. William P. Reese, Chief Electrician of the Ideal Cement Company, gives us a thorough case study in modern electrification techniques applied to cement manufacturing, beginning on page 76. In this type of operation it is important to note that considerable manufacturing advantages are made possible by centralizing distribution control and motor operation. Many of the ideas presented will be found useful in designing the electrification requirements of other plants with similar manufacturing problems.

Program Control

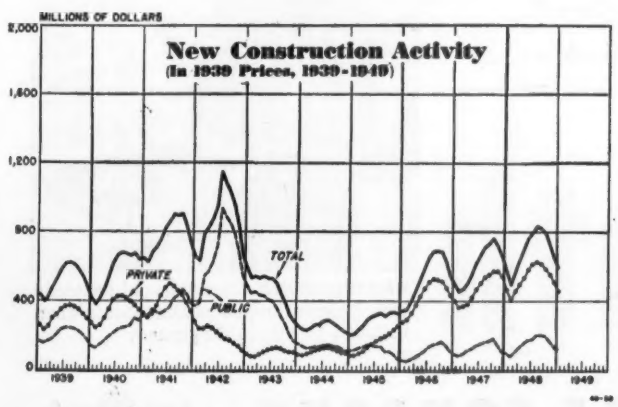
Clocks and program systems are an important element in the administration of many commercial, industrial and institutional operations. In A. A. Schuhler's series on communication, the article this month, "Clocks and Programs," beginning on page 74, takes up the layout, wiring, and equipment for modern clock and program systems.

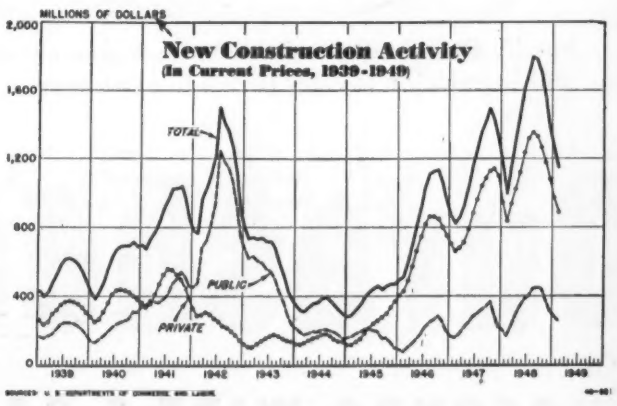
Motor Shop Efficiency

Current emphasis on cost control has stirred up substantial interest among the motor shops in better procedures and shop methods. The Erie Electric Company of Buffalo is working toward better shop efficiency through practical methods and management, modern equipment and lighting, work-flow department arrangements and improved labor relations. The story of this modern shop begins on page 65.

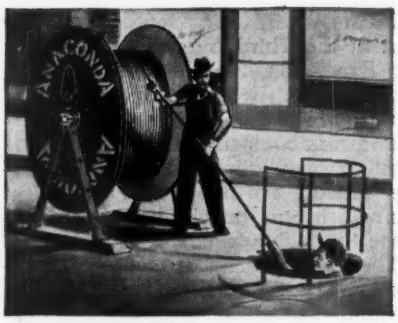
Bidding

Current bids are reflecting a change in pricing policies that needs more critical analysis. On one project, for instance, the top bid was 80 percent greater than the low. There was a 20 percent difference between the low and second bidder. Obviously, some bids today are feelers to test the competition, but a wide range on the low three bids is always a danger signal. The first quarter jitters shook some fat out of prices in many lines but it would take inside dope on a truly spectacular price movement to justify some of the low bids of recent weeks. Current trends invite caution and thoughtful appraisal. It is certainly no time for playing economic long shots.

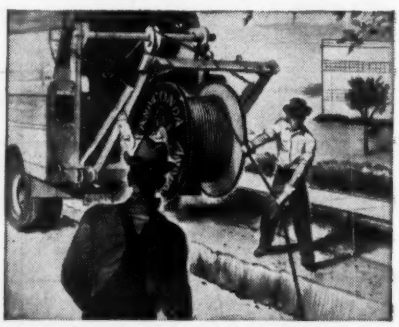




IN THE AIR—In single or grouped conductors, Durasheath truly provides the one-type cable for all-type use.



IN CONDUIT—Moisture, oil, acid resistance of neoprene jacket make Durasheath an ideal cable for this application.



UNDERGROUND—Toughness of neoprene jacket assures long life of Durasheath when installed directly in the ground.

For power distribution between farm buildings, in street lighting systems, airports, mines, industrial plants, railroad signal systems, real estate developments—to mention a few—Durasheath gives you a *run* for your money. You can use Durasheath in a continuous run that is partly underground, in conduit and in the air. Here's why:

Tough neoprene jacket is *unaffected by electrolysis*, corrosion and extremes in temperature.

Greater flexibility makes handling easier.

It's rugged: high resistance to oils, flame, abrasion, cutting, impact and the moisture, acids and alkalies found in the soil.

Specify Durasheath: available in small sizes or large, single or multi-conductor, to carry from 0 to 5,000 volts. 49429

Durasheath

ANACONDA WIRE & CABLE COMPANY

25 Broadway, New York 4, N.Y.

ANACONDA
from mine to consumer

DESIGN FOR SERVICE

UTILIZATION of electrical energy is persistently growing. There seems to be no end to the variety and complexity of electrical apparatus moving into factories, stores and homes. And our adaptations are so confident new devices quickly become essential. It is not at all unusual for a new machine, which maybe did not exist a few years ago, to become so necessary that management can not tolerate a shutdown for more than a few hours. And as utilization grows, the industrial electric service shop is called upon to handle larger and more critical responsibilities.

THE RELATIONSHIP between electrical utilization growth, which is practically synonymous with industrial progress, and convenient, economical service and repair facilities, is a closely dependent one. Without ready access to skilled service, we could not afford mass production methods or continuous process techniques. Minor electrical failures would be far too costly. But because we have a number of electrical service enterprises, with fine experience and technical resources, in every industrial community, we have the utmost freedom to take full advantage of electric power and control.

WITHOUT FACILITIES for electrical repair and maintenance, our American industrial machine could operate for only a few days. Great numbers of electrical devices are employed. Their intricate interdependence multiplies the critical points where interruption can cripple operation far remote from the breakdown.

ELECTRICAL SERVICE FOLKS do not often give thought to their vital role in the national economy. They are practical people who carry out their work efficiently and economically. And because they have to bring an unusually comprehensive array of technical knowledge and experience to their tasks, they have little concern with the deeper significance of their skill and enterprise.

OUR INDUSTRIAL electrical service enterprises may modestly ignore their critical economic function. They are, individually, relatively small business concerns. They are usually independently owned and operated. Their executives are very close to their operations and their customers. Their orbits ordinarily enclose only a few dozen square miles. But commerce and industry, and particularly the electrical industry, dare not forget for a moment the vital importance of these establishments to all of us.

Wm. F. Stuart

Keep Business Buzzing

with signaling via Graybar

Show your customer how, with a flick of a lever, he can "buzz" or talk to anyone, anywhere in his plant. Point out that clear, fast communication among various departments saves many hours of time ordinarily lost in locating personnel, issuing urgent orders and checking operations. Then remember that Graybar has all the voice or code-paging equipment you need to fill your contract quickly and efficiently.

From "intercom" to siren

There's Webster Electric Teletalk, an amplified communication system that connects him directly with personnel at selected points in his plant. It relieves switchboard congestion and saves countless steps through two-way or multiple inter-office conversations. There's the Edwards Lokator, a paging system that speeds location of personnel throughout the plant. Installations can be made with a wide variety of signals — from buzzers, musical notes or silent flashing lights to bells, horns, or howlers that will penetrate any plant noise. Or he may like UIS Sound-powered Telephones. For common or selective talking systems, these handsets transmit distortion-free conversations over long circuits without external power! A rugged weatherproof set is available with magneto howler signals. For warning, Graybar has Benjamin and Federal sirens.

Expert help in planning

Your local Graybar Representative will give you complete information on all types of talking, calling, warning, and locating equipment. A Graybar Signaling Specialist will gladly work with you in choosing the best combination of devices and accessories for any installation.

Other electrical systems

Graybar offers you similar service in the selection and procurement of supplies for lighting, wiring, ventilation, and other electrical installations.

Graybar Electric Company, Inc. Executive offices: Graybar Bldg., New York 17, N.Y.

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IN OVER 100 PRINCIPAL CITIES

You get the best of everything electrical

Via GraybaR

MOTOR SHOP EFFICIENCY

LARGE SUPPLY OF SPARE MOTORS, *both a-c and d-c, 25-, 50- and 60-cycles, makes it possible to promptly substitute a repaired unit for an Erie customer, maintaining service with minimum shut-down.*

Practical methods and management, modern equipment and lighting, work-flow department arrangement and excellent labor relations promote efficiency of Erie Electric Company.

By Hugh P. Scott

THE Erie Electric Company of Buffalo, New York has a high standing in the fields of motor repair and transformer construction. And the reputation is definitely merited. For plant layout, equipment, shop methods and management procedures indicate that efficiency is not a coincidence. It is planned.

Located three short blocks from the city's centrally-located Niagara Square, the office is convenient for both employees and customers. And, served by a large parking lot, ample loading areas and an adjacent railroad freight depot, motors and transformers can be received or shipped by truck or rail with equal facility. Large sliding doors make it possible for trucks to directly enter the transformer plant, and loading platforms provide for rapid transfer between trucks and motor departments. An extensive system of overhead rails and traveling hoists —manually operated or electrically controlled—moves equipment with maximum ease and minimum delay, while a freight elevator serves the several floors devoted to motor shipping, storage and repair. Throughout the plant, department and area layouts coincide with the normal flow of repair and construction, so that work moves with planned direction and nonproductive movement of equipment is greatly curtailed.

Physically, Erie Electric occupies slightly more than 55,000 square feet of floor area, including a 4-story 70-by-100-foot brick building, an adjacent 2-story 100-by-100-foot structure and a separate single-story 50-by-150-foot building.

In the main unit, the first floor is devoted to administrative, engineering, normal business and clerical functions. That considerable thought has been given to personnel efficiency, comfort and health is evidenced by electric comptometers and dictaphones, germicidal lamps, thermostatically-controlled unit heaters and 4-lamp diffused fluorescent lighting fixtures on 10-by-10-foot centers, suspended beneath an acoustical tile ceiling. President John H. Darby, vice president Donald C. McPhail, secretary C. C. Worth and

GEORGE SUTTON *brings out connections of G.E. 50-hp., 365-rpm., 440-volt, 3-phase induction motor and checks for grounds with portable testing unit rated for 500-2500 volts.*

C. L. PERRY *uses his suitcase-contained portable tester to check for shorts and grounds. Earphones transmit audible hum which ceases when fault is contacted by detection leads.*

OFFICES *utilize electric comptometers and dictaphones, germicidal units on walls, fluorescent lighting and acoustical ceilings to promote comfort, health and efficiency of employees.*

engineer H. E. Gabel, Jr. unanimously believe that their attractive, modern offices, large shop areas, time- and labor-saving equipment, materials-handling facilities, temperature control and provisions for radio reception in certain areas pay direct dividends in customer relations, personnel morale, and real down-to-earth efficiency.

The next two floors of this main building are for motor repair—with winding operations centered on the third level and general assembly work concentrated on the second. On these floors, both fluorescent and incandescent lighting is functionally positioned to provide high-level sight-saving illumination on benches and all work areas. Modern coil winders, rotating-brush wire strippers and similar equipments facilitate winding and wiring operations. Electric baking ovens (designed and constructed in the plant) provide closely-regulated (both time and temperature) heat for curing both standard and high-temperature varnishes. A lever-operated dead-front control board provides 25- and 60-cycle current at 110-, 220- and 440-volts for complete motor testing, and an ample supply of portable testing equipment is available for checking motor characteristics at local shop areas or in the field. Washing and cleaning booths, with large capacity exhausts and explosion-proof lighting units; dipping tanks and ovens served by overhead cranes; a compact stock room and first-aid station all contribute to planned efficiency.

The fourth floor is used exclusively for storage, with small repaired motors (fractional to 15-horsepower), meters and controllers, pulley sheaves and bed plates, insulators and bushings, nipples and condulets stocked in separate areas.

The adjacent 2-story structure houses the modern transformer construction plant (Niagara Transformers) and, as in the motor-repair sections, safety, back-saving equipment, materials-handling facilities and above-average working conditions are prevalent. The building is well-lighted by 2-lamp industrial fluorescent fixtures mounted in continuous rows on 15-foot centers along the 20-foot ceiling. Three 5-ton 2-rail traveling cranes serve the main floor while two remote-control hoists (3- and 15-ton capacities) raise equipment and materials through a well to the second floor level. A 220-square-foot spray booth, lighted by seven 500-watt explosion-proof incandescent units and ventilated by an over-sized exhaust fan positioned centrally in the 15-foot high ceiling, is used solely for transformer work, with units moved in and out of the booth on roller skids, dollies or by monorail cranes. Goggles, masks, gloves and protective clothing are conveniently stored for the protection of men working in this area. In the transformer section also, a plant-designed and constructed electric oven serves the specific needs of this division. Thermostatically-controlled unit heaters are mounted near the large sliding doors and in all major sections of the shop.

The second floor is devoted to the storage of wire, wooden wedges, tapes and other binding materials, sleeve insulation and associated materials. Here, also, are located coil-winding racks, wire reel stands and coil dipping tanks.

Additional storage (large motors) and transformer tank welding is centered in the separate, previously mentioned, 50-by-150-foot building.

As would be expected, operating techniques and methods also indicate efficiency and ingenuity.

One example is a portable armature

CLAYTON PFOHL *uses all-glass Class B insulation on coils designed for 500-kva., dry type power transformer.*

testing unit, designed and constructed by C. L. Perry. Compactly assembled to fit into a 4-by-12-by-18-inch suitcase, it can be carried into the field or easily moved about the shop. And, with self-contained dry batteries, it becomes possible to test for shorts and grounds even when no local current exists. Earphones transmit an audible signal for testing purposes or, when desired, small signal lamps can be utilized as an auxiliary check. Although designed to locate dead grounds in armatures, motors, generators and cables as well as shorts between the top and bottom coils of small motors and armatures, the unit has successfully been used on equipment up to 200 horsepower. In operation, ground detection is rapid and positive. For example, one lead is placed on the commutator, the other on the shaft and the armature is slowly rotated. The audible signal in the earphones continues until the ground is reached and, when the sound ceases, the ground is located.

Several practical methods are employed in the motor winding department and, although not strictly classed as a method, a word can be said concerning the functional lighting in the a-c stator winding section supervised by George Sutton. In this 15-foot-square area, eight 40-watt fluorescent and two 200-watt incandescent lamps provide 80 footcandles of illumination on stators that are positioned either by rolling working platforms or by overhead monorail in this square of light. Fluorescent units are suspended horizontally on 45-degree planes to direct the light inward towards the working center, while incandescent fixtures are mounted on adjustable, telescopic arms that can be regulated for any desired lighting result. Directly over the area, to dissipate lamp heat, a ceiling fan is strategically mounted.

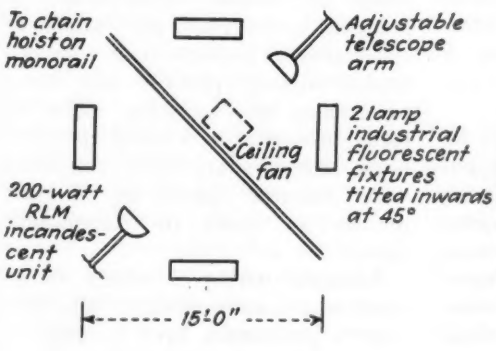
Also in this area is a useful coil heater to slightly soften insulating varnish when stator coils are too fat to slip snugly into the slots. In such cases, coils are heated to approximately 150 degrees and are then easily pressed into position on the stator. In construction, the box is truck-size, asbestos lined, with a 1000-watt unit heater at the bottom and bracket supports near the top to support the coils.

One more detail in the motor repair section deserves comment—the positioning of dipping tanks and baking ovens. These units are situated in the same alcove with an overhead monorail and floor rails extending between them. In this position, motors can be lifted directly from the tank, lowered onto a rolling platform and wheeled into the oven.

In all, Erie Electric has four electric ovens, constructed with double ¼-inch steel walls and doors, insulated by rock wool and asbestos, electrically controlled for both time and temperature, and equipped with positive exhaust equipment. Men operating these electric units state that temperatures are more closely regulated and curing is more thorough than by other forms of heat formerly used in this plant. Although the majority of rewinding is with standard insulations and varnishes, the shop is equipped with the necessary stock and facilities for using fiberglas, mica, silicones and other high temperature products whenever specified or required.

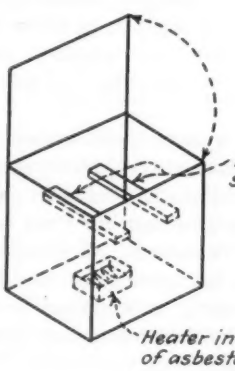
Since the plant is conveniently located to the center of town and since Erie executives recognize the promotional value resulting from first-hand customer inspections, those who have business relations with the company are urged to visit the plant. Such inspections promote public interest and confidence, for observation of modern methods and modern equipment is a potent, effective way to prove the value of a job well done.

With 75 employees (25 in the motor repair section) working full time to serve both local and national customers, Erie finds that efficiency is good business. And this efficiency bypasses the element of chance for it is the resut of sound planning. Planned for service.


To chain hoist on monorail
Adjustable telescope arm
2 lamp industrial fluorescent fixtures tilted inwards at 45°
Ceiling fan
200-watt RLM incandescent unit
15'-0"

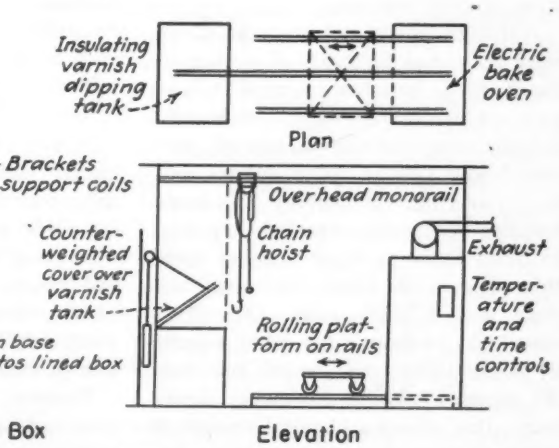
Lighting Plan in Stator Winding Area

FLUORESCENT INDUSTRIAL FIXTURES, *inclined on 45-degree planes, and adjustable incandescent units on telescopic arms combine to deliver 80 footcandles to work areas in stator winding section.*



Phantom View of Coin Box

SKETCH OF COIL HEATER *indicates coil bracket supports and 1000-watt unit heater used to soften insulation on coils too snug for stator slots.*



Elevation

OVERHEAD MONORAIL AND HOIST *facilitate raising of dipped stators from insulating varnish tank. Units are then lowered to rolling platform, which enters baking over on floor rails.*

GROUP HOUSING projects provide a major market for wiring and modern electrical conveniences.

MASS HOUSING of the multiple unit apartment house type are

PLUS VALUES IN RESIDENTIAL

IN THE months immediately ahead residential building will reach its seasonal peak. The predicted value of residential construction, privately and publicly financed, approaches $6½ billions for the year. As a market for electrical work, the potential is in the order of $540 million.

Although early in the year there were fears and forecasts of a drop in the housing business, current indicators are pointing upward. In March, homebuilding activity dipped 16 percent below 1948 in dollar volume, but is recovering. A survey of home builders last month revealed they plan to build about as many housing units this year as in 1948. The total last year was 875,000 units. Overall it now looks as though the dollar volume of homebuilding will be off less than 10 percent. With somewhat lower costs, that means a physical volume of building very close to last year's figures.

A market potential in excess of a half billion dollars in electrical work, however, cannot be achieved on the basis of "bare-bones" wiring systems. It can be achieved if a part of the current lag between conventional wiring designs and modern utilization requirements is pulled up.

House wiring is essentially conservative. New standards, methods and practices are adopted slowly against the stubborn resistance of sharp competition within the industry and a militantly cost-conscious building fraternity.

At the consumer level there is no similar conservatism. Modern appliances continue to be sold with spreading public enthusiasm for their works. Advancing standards of illumination find ready acceptance in the home. Electric heating is inhibited in some areas only by the present lack of available power.

Modern electrical demands are most conspicuous in new housing, whether a single family cottage or a great urban apartment building. Larger housing projects, with competent engineering design, will be equipped to serve the predictable requirements but a substantial proportion of individual homes are falling far short of electrical capacity to serve even the more popular appliances on the market today.

Several factors in current building indicate that the era immediately ahead offers an unusual opportunity for breaking away from past standards and practices. In some areas a buyer's market already prevails and buyer preferences are becoming more directly influential in housing specifications. Builders are again concerned with "features" which set off their product in terms of recognizable values.

Adequate wiring is widely recognized as a saleable feature. Wherever buyer's preferences have a chance to operate, the adequately wired home will more than carry the modest additional cost of modern electrical facilities. This advantage must be pressed, however, through continued industry effort and cooperation to outweigh the growing pressure toward lower building costs.

important features of current urban building programs.

INDIVIDUAL HOMES carefully designed and built for modern living are show places of modern electrical convenience.

WIRING

Better wiring jobs total up to greater markets, and more opportunities. How to build residential volume.

By W. T. Stuart

Historically, residential building has been badly underwired. Once installed, house wiring is indifferently maintained and rarely augmented except for major appliance installations. Such wiring systems are called upon to supply a steadily growing load of light, power, and heat devices. In those areas where Adequate Wiring programs have enlisted strong industry cooperation, home buyers can find houses which provide the facilities and capacity for modern electrical living. But unless Adequate Wiring has been a recognized feature of the specification, the chances are that electrical facilities are at a minimum code level.

With buyer preference in action, there will be more adequately wired jobs. But they will not come automatically. They must be sold. And the most elementary consideration for effective selling is that superior value must be demonstrated and displayed.

An inherent problem in selling wiring is the simple fact that so little of it shows. The superiority of larger conductors, effective circuiting and many other important features of design and installation can only be demonstrated by technical discussion or cumbersome equipment. If however, there is tangible evidence of a better-than-average electrical system, its background of superior engineering is readily accepted—and willingly paid for.

Value Must Be Sold

It is the purpose of this article to point up some of the distinct "plus values" that are available to help identify the modern wiring system, and to provide saleable features of obvious convenience or utility. It is important to emphasize, however, that the effective use of such features depends fundamentally on sound over-all wiring design.

There are familiar parallels in other industries. For instance, a new automobile may have a smart body design, a particularly attractive instrument panel, automatic step lights or some other feature which weighs more in sales effort than horsepower or oil filtering. But they are useless as sales helps unless the engineering features are there in full measure.

Some treatment of costs is in order. Residential wiring costs are a very small part of total building costs. The wiring system, however, represents a substantial element in the ultimate comfort, convenience and utility of the home. The long history of underwired houses has produced a similiar history of inadequate wiring budgets. When prevailing standards are at minimum levels, any improvement necessarily requires a larger cost outlay. Prevailing wiring budgets, the "going price" that is generally accepted as representating a fair value in house wiring, must be substantially increased to provide for growing electrical needs.

When contractors work directly with home owners, the task of expanding the wiring budget is not so difficult. The buyer who is going to live with the wiring system is quick to recognize conveniences and advantages in modern wiring. It is not at all unusual for owners who have had some elec-

trical industry experience or close contact with electrical systems in industrial plants to go well beyond the contractors recommendations.

Where the contractor must work through building-industry channels, however, he is more likely to encounter obsolete cost ratios and long established rule-of-thumb comparisons which freeze wiring budgets to arbitrary relationships with other building costs. This is an important challenge to our industry's ability to educate the building industry at all levels.

It must be remembered that wiring costs bear little relationship to structural size. A minimum utilization installation and one designed for modern convenience and use will be widely different in cost in exactly identical structures. This fact is of the utmost importance in understanding wiring costs.

In house building, volumes and areas largely determine the quantities and consequently the costs of most construction features. Foundations, painting and roofing are examples. Deviations from minimum requirements are in the direction of superior quality, longer life, greater safety or better appearance. Such quality levels can be readily and arbitrarily selected to match the general quality and price range of the house.

In wiring, the deviations from minimum requirements are quantitative. They represent more outlets, provision for electric cooking, added conveniences and comforts made possible through more and easier use of electricity. The increase in cost is the result of providing for more use. Such cost increases can not be avoided by substituting cheaper materials or methods of equivalent function. They can only be avoided by cutting down present or potential use of the system. To project wiring budgets beyond current levels will take more than a simple offering of more and better wiring. Through larger jobs, the over-riding costs and expense of job operation can be pared to give better unit values—more money, but a better buy.

Improvement in wiring values can also be achieved by better job methods. Much housing, particularly individual home building, is still hand work with mechanically primitive hand tools. However skillfully the work is carried out, much of it is still relatively uncritical human muscle power, the most expensive form of energy available.

Small contractors who specialize in house wiring rarely have the facilities or manpower for job planning, organization or critical cost control. Those who do, find them just as essential on individual homes as on huge multiple unit projects. House wiring jobs are relatively small, yet have to support a large amount of non-productive time for travel, set up, layout, material handling and cleanup.

Job scheduling and effective supervision can cut a large percentage of non-productive time. Among some of the successful cost cutting methods in use are:

1. Time schedules. A projected time and progress estimate for each job should be ready to be applied as soon as the job starts. These need not be, and rarely are, elaborate. They avoid too—early starts, fill-in work, short days and other non-productive jobbing.

2. Inventory control. A full stock of required materials and enough over to meet reasonable needs should be ready when they are needed on the job. One of the most effective methods is the completely stocked truck which travels with the wiring crew.

3. Wiring plans. No matter how conventional, each job needs a wiring plan, detailed or rough, but enough to show the important job data. Many important extras have been lost because the wiring crew failed to rough in for them through lack of specific job plans.

4. Special tools. House wiring is production work under special circumstances. Tools, ladders and other equipment should be equally specialized and conveniently stowed in the truck.

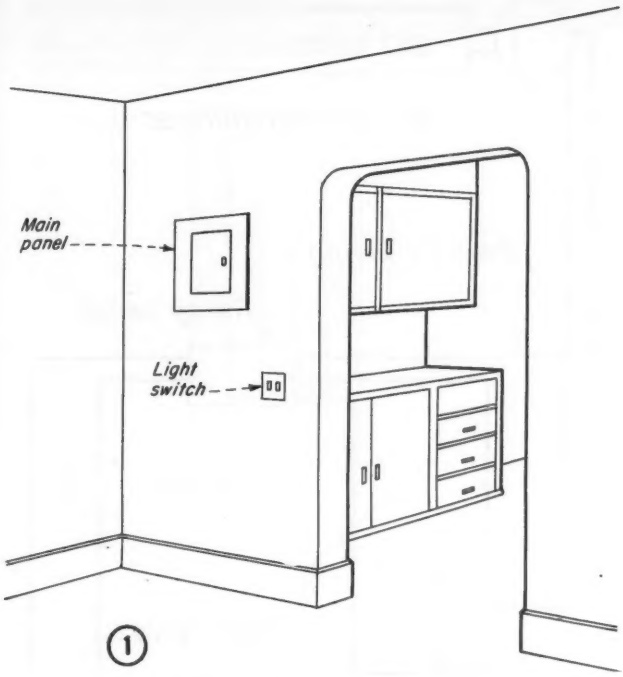
5. Power tools. Wherever practical, power tools should be used for drilling, cutting, soldering, etc. The gains on individual jobs may seem small but they total impressively. A small gasoline powered generator can provide power on new work not yet connected to utility lines.

6. Cost Accounting. A simple job envelope system provides a good means of accounting for all materials, equipment and labor hours, but regardless of the system used, it should be accurate and detailed.

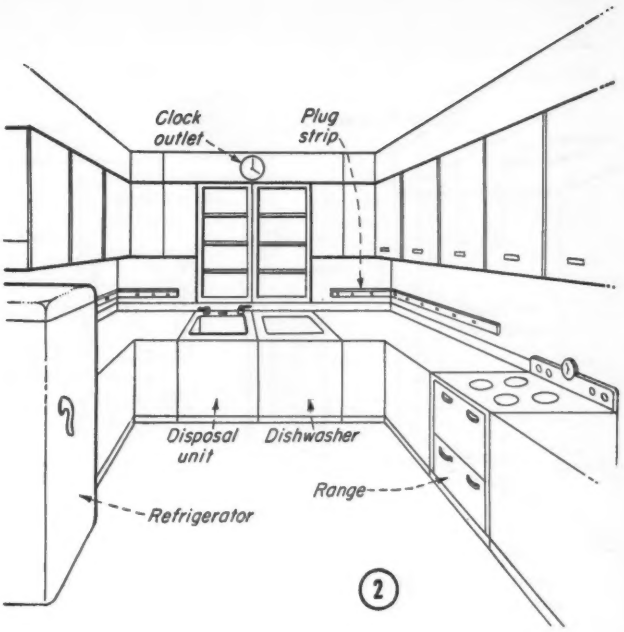
In the following pages are listed and sketched some of the plus value items in house wiring that help to sell.

Plus value items need not be costly. They can often be entirely conventional wiring items used with good sales sense. They are items which the owner will show off to friends. In going through a home with its new owner, it is often enlightening to note the electrical features which he finds worth talking about. His appraisal, however uncritical technically, is of the utmost importance in sorting out the items which will help sell modern wiring and point the way to better wiring jobs.

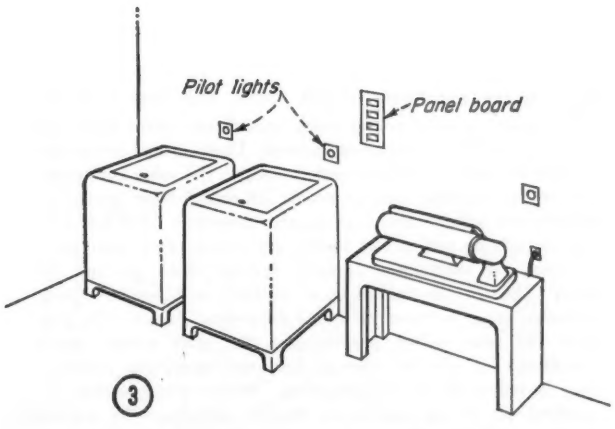
Where utility lines are not connected, truck mounted portable gasoline generator sets can provide needed power economically.



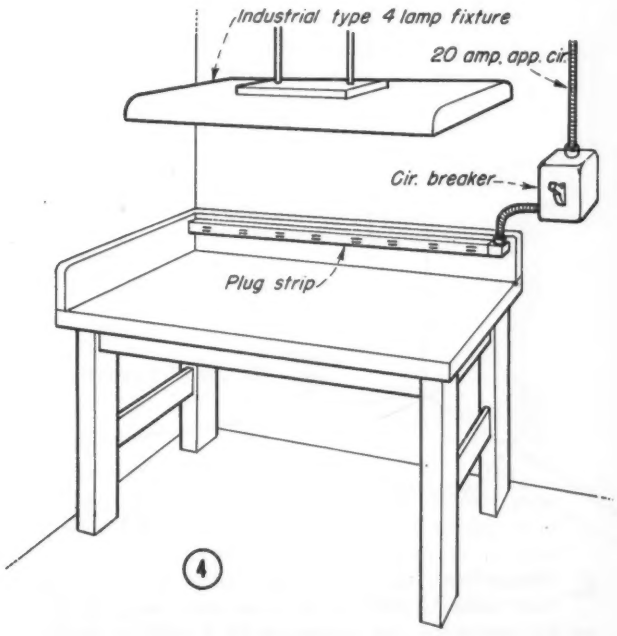
1. Panelboard load centers at convenient, easily accessible points are not only good plus value but good design. In many areas, outdoor metering is standard and flush, first floor, service equipment fully acceptable. Even with a basement entrance and meter board array however, circuit protection and control should be centered at conveniently accessible points. Modern panels and load centers carry attractive trims for flush mounting and need not be incongruous with final kitchen, utility room, or hallway appointments.



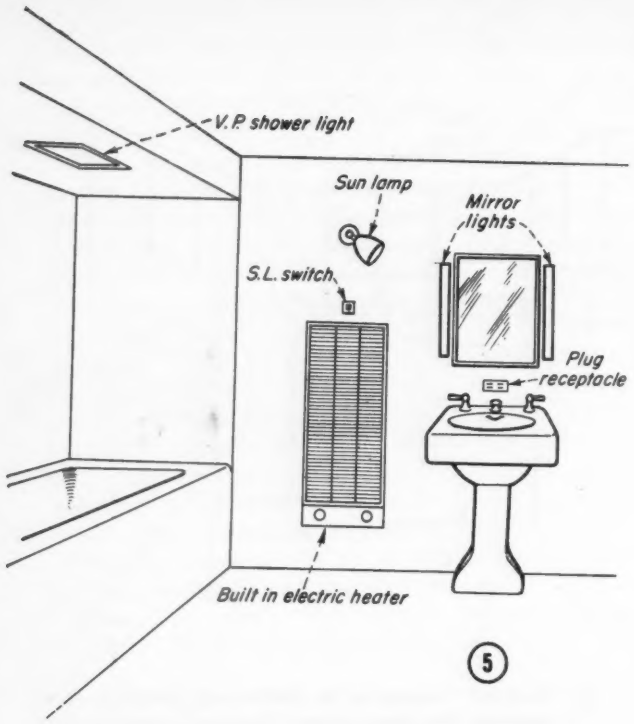
2. Electrical features in the kitchen are always a showplace for the wiring system. Kitchen equipment is fixed in a predetermined pattern. This is a clear invitation to built-in lighting, flush or close mounted at the ceiling and lighting strips under the cabinets. Lighting strips inside the cabinets which light automatically when doors are opened is another opportunity. The range and refrigerator circuits are conventional. An outlet and circuit for a disposal unit and dishwasher are also important whether the equipment is installed or not. Multiple outlet strips for plug-in appliances along the work counters are practical essentials.



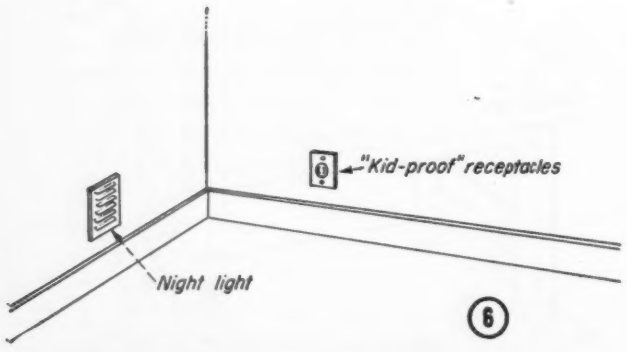
3. Utility room or basement laundry electrical facilities should be in character with the modern automatic equipment which promises to revolutionize household laundry practice. Outlets should be grounding type. The dryer will take around 5 kw., the ironer another 1½ kw. Don't allow for diversity here, washer, dryer and ironer are likely to be working at the same time. A good plus value is a flush panel close by and pilot lights above each appliance outlet. Good built-in lighting is also indicated in this area.



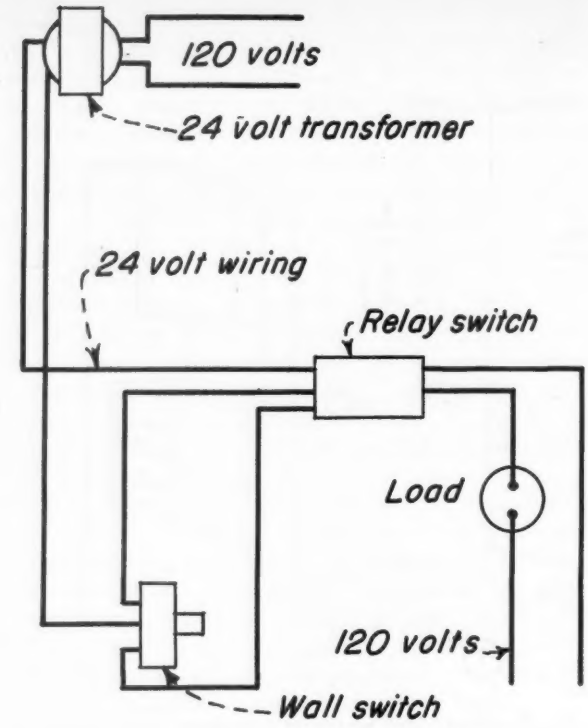
4. Hobby shops are a standard feature of many modern houses. They may be a part of the basement, the utility room or the garage. They are almost always ignored electrically. Here's a place for plus value wiring where it will get critical attention. A full circuit, at least, should be extended to a circuit breaker and plenty of plug receptacles, multiple outlet strips or blank outlets for future connection. Lighting should be the best, a good four lamp industrial type fixture or its equivalent to give 100 footcandles or more.

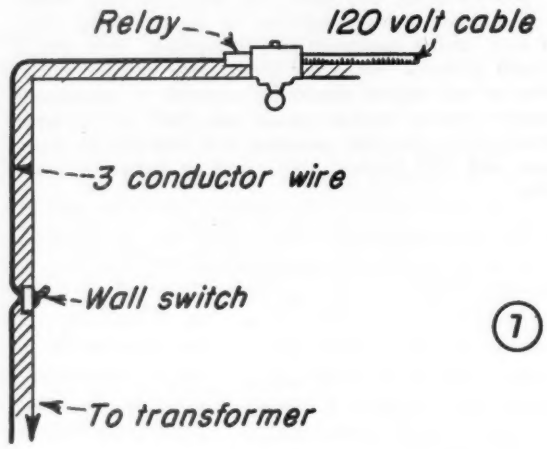


5. Bathroom appointments in new homes are usually luxurious. Electrical features ought to be in keeping. Several plus values are practical among them in the built-in electric heater, a device which, with persistent promotion can become a standard feature in even the most modest houses. A sun lamp, on a swivel mount with separate switch control is a notable value, as are built-in flush shower lights and fluorescent cabinet or mirror brackets. All should be wall switched, with silent switches. The convenience outlet is a concession to the electric shaver, but portable or plug-in devices should be discouraged.

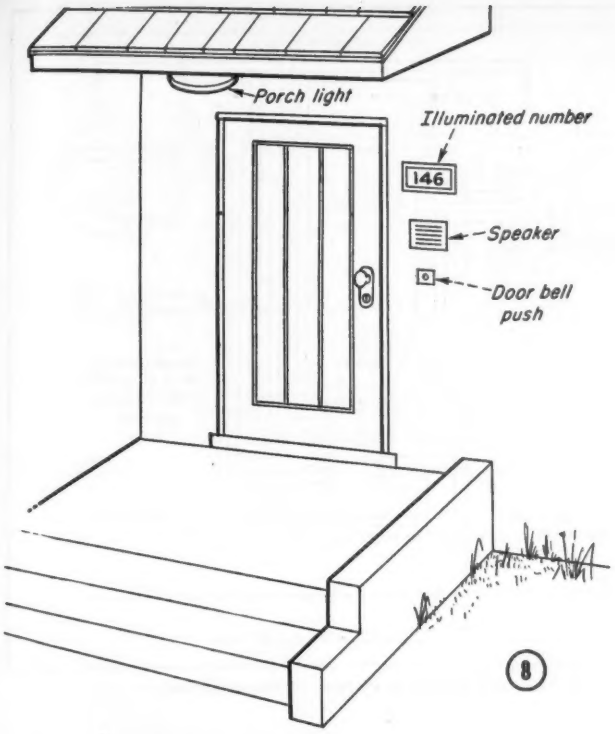


6. Nursery ideas have natural sales appeal for the family with infants or small fry. In rooms where small children are left unattended, plug receptacles are a source of danger. Kid-proof devices are available which will defy all but the most ingenious. Flush built-in lighting, indirect lighting from window valances are useful and attractive and eliminate the need for portable, and consequently dangerous, lamps. A low-mounted flush night light, below crib level, bright enough to allow quick check-up without disturbance is another popular value. When the nursery is upstairs or remote from the living room, an inexpensive electronic intercommunication system will provide step-saving surveillance.

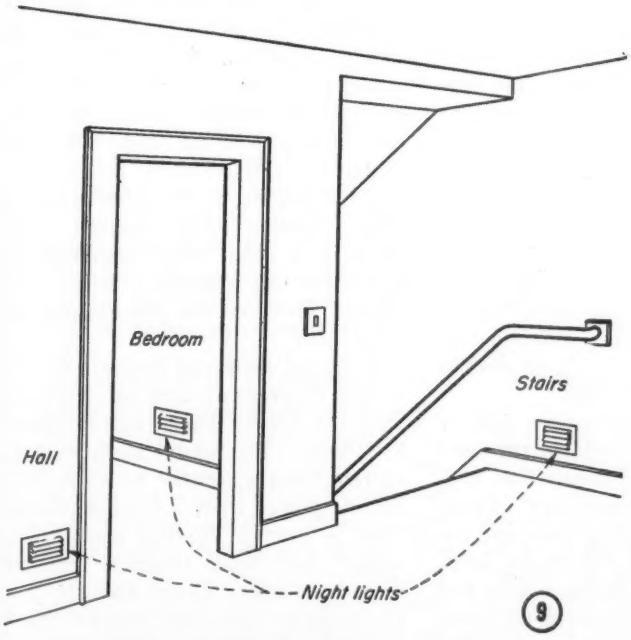




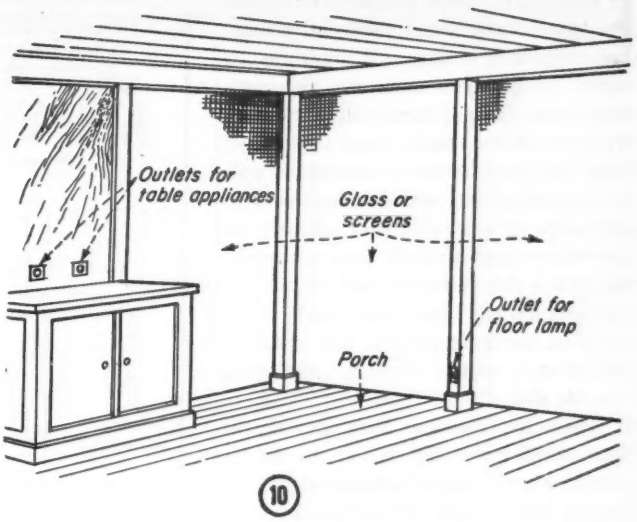
7. For the completely modern touch, new relay switching systems have a strong sales appeal and offer unlimited scope for useful and ingenious control. Lighting and receptacle circuits are switched by concealed relays. The relay coils operate at low voltage (approximately 24 volts) from a central transformer with current limiting characteristics. The low voltage circuits do not require further protection. Push buttons or switches are momentary contact devices which position the relay. They can be hooked up in multiple, with master control stations, time switches or other automatic devices. In general, the relay switch provides for the home wiring system essentially of all the control features heretofore available only in industrial control apparatus. While relay switches will perform all of the operations usually performed by manual tumbler switches, they are readily adaptable to particular circuits or special use in otherwise conventionally switched systems. Typical examples are master control of outside lights, master switching of lights in principal rooms throughout the house, remote control switching and similar applications. Typical wiring for low voltage control circuits is three conductor No. 18 or No. 22 solid wire, usually plastic insulated. Still new in national distribution, the possibilities for novel and convenient controls through the use of these systems are relatively unexplored.



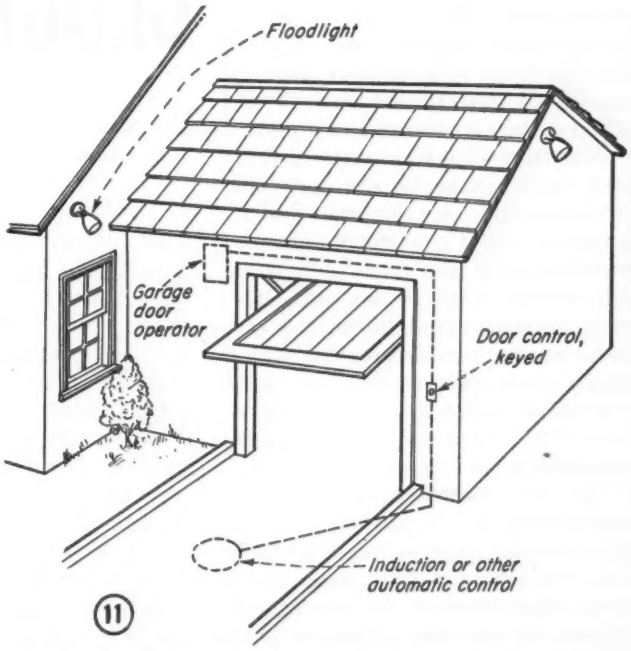
8. Extra electrical features around the front door can add materially to convenience, privacy and safety. The illuminated house number is clear identification, step lights prevent accidents. The light above or side brackets can be switched from the *outside*, or better, relay operated by pressing the door bell push. A small flush speaker operates on an electronic intercommunication system from the kitchen or bedroom. Another feature useful far beyond its slight cost is a "late" bell, a soft toned bell or buzzer in the living room and master bedroom with a switch to open the main door chime circuit. Late callers or family night owls can be received without arousing the household.



9. Built-in night lights, flush units of low wattage set low in the walls to illuminate strategic nocturnal paths are important safety devices. The cost of operation is so low that facilities for switching are usually unnecessary. They should be installed at stairs, in halls, bathrooms, bedrooms and telephone locations.



10. Most new homes are oriented to provide a private porch or terrace for outdoor living during the summer months. With table appliances, much of the meal preparation can be carried outdoors as well. Few such porches or terraces are equipped with more than a single plug receptacle. A useful plus value is an extension of an appliance circuit to the porch with two or more outlets.



11. Electric garage door operation adds definite owner pride in his electrical system, as well as substantial convenience. The operators can be actuated by a keyed button on a post or from an induction or other remote device installed in the car. The garage and outside lights may be switched by the mechanism.

Protective area lighting to flood all sides of the house, master switched from bedroom, halls and doors is a convenience and safety feature much appreciated by home owners, especially in suburban areas. The lights can be plain weatherproof sockets with bare lamps on outlet boxes set under the eaves or more powerful reflector lamps. Relay switching provides convenient control or they can be operated from a separate circuit. Decorative outdoor lighting for gardens, drives and walks are also important plus values.

CLOCKS and PROGRAMS

By A. A. Schuhler

ELECTRIC clock systems of various types have been used in practically every form of building in order to produce accurate and uniform time. In addition, automatic program systems have been combined with the clock systems in schools, colleges, institutions and industrials. The program device controls signals at pre-determined periods and uniformly regulates the activities and routine of persons during their daily work, study or play, such as periods for starting, stopping, recess, lunch, changing classes etc.

The clock system may be of the type employing the use of a master clock wound either magnetically, by motor and weight or driven by synchronous motors. Self-regulating features are provided to operate secondary clocks by means of electrical impulses, either individually or collectively, or all clocks may be operated by means of synchronous motors with similar regulation as for the master clock system.

The program systems vary with the number of signaling circuits. A single circuit will ring all signal devices simultaneously. Multiple circuits such as 2, 4, 6 or 8 programs will result in the operation of that many different groups of signals so that they will only affect certain departments or classes.

Manual control of circuits is desirable in addition to the automatic program controls. For this purpose program master pushbuttons are provided on the master clock. A program bell control board is also used. This unit contains a pushbutton for each signal device and is provided with a plug arrangement so that any signal device or pushbutton may easily be transferred from one program circuit to another.

An intercommunicating telephone system may also be combined with the program bell control board which by the addition of a handphone, switch and relay becomes the master telephone. By installing telephones in the classrooms of a school, this master telephone may call and converse with any of the outlying instruments. The outlying units in turn may also call the master station.

Auxiliary devices such as time clocks, time stamps, valves etc. may also be controlled from the master clocks and program instruments.

The same preliminary procedure should be followed as outlined in previous articles for laying out signal systems. In systems where clocks, program signals and/or telephones are used and operate on 24 volts, all systems may be installed in the same conduit. Where synchronous motored clocks operate on 115 volts, the signal devices must also operate on 115 volts in order to be installed in the same conduit. If the program system is to operate on 24 volts a separate conduit system must be provided for each system. For the addition of telephones, this again may also be installed with the systems operating on 24 volts, but must be in a separate conduit if the clocks or the signal devices are to operate on 115 volts.

Clock and program systems with or without telephones should be provided with ample terminal connection cabinets, preferably on every floor. A plan should be made showing these and the relative locations of the clocks, bells, buzzers, telephones, power supply and the number of wires between all points together with the sizes of conduits. While in a system using the same conduit all wires may terminate in the same terminal cabinets and pull boxes, the connection strips should be separated slightly and properly identified. A separate chart should be made to show the size of each terminal strip cabinet or pull box, the number and the capacity of the terminal strips. A chart to be enclosed within the cabinets should show the actual wire connections to terminals and should indicate the location of the other terminal strip cabinets interconnected with same. It is often found advantageous to enclose one common chart in each cabinet showing the connections on every floor.

A typical clock and program system wiring diagram as used in schools is shown in Fig. 1. The system functions as follows: The master clock receives current from a rectifier which in turn derives power from a separate circuit from a nearby lighting panel. The master clock sends electrical impulses to the secondary clocks and the program device once each minute which advances all units to the next minute. Once each hour all secondary clocks are regulated so that those which are slow are advanced to the correct time, while those that are fast are held immobile temporarily and are then re-

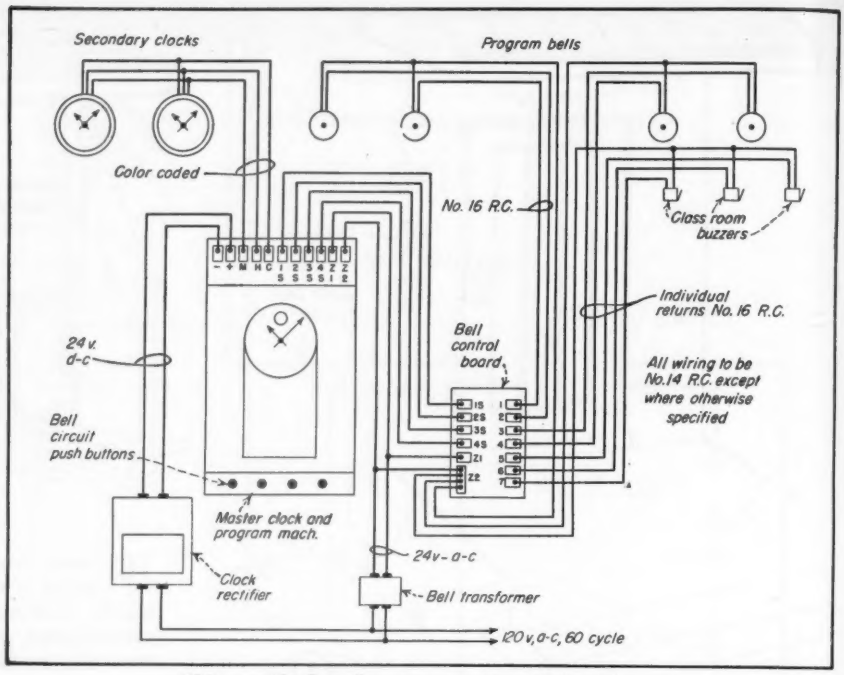


FIG. 1—*Clock and program system wiring diagram.*

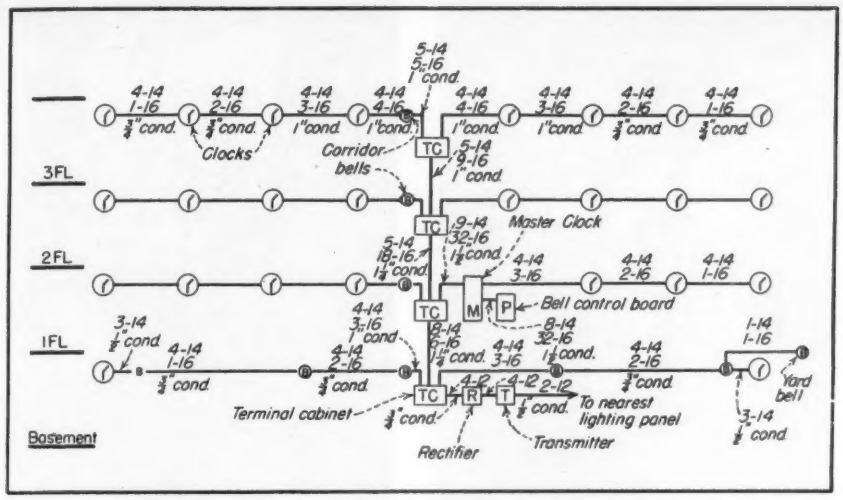


FIG. 2—*Clock and program system riser layout.*

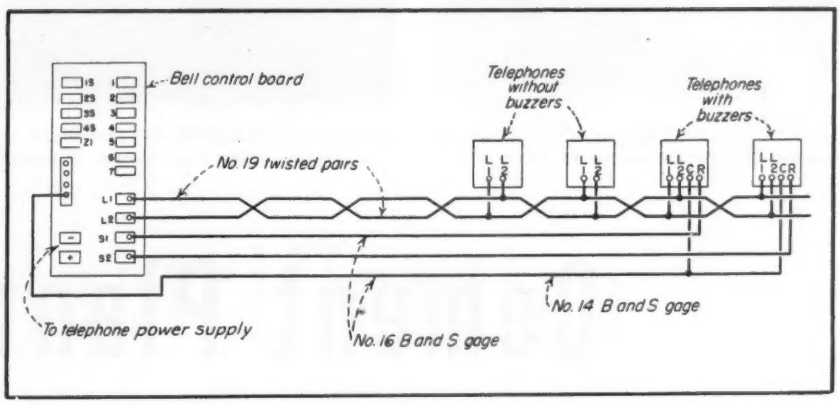

Bell control board
No. 19 twisted pairs
Telephones without buzzers
Telephones with buzzers
To telephone power supply
No. 16 B and S gage
No. 14 B and S gage

FIG. 3—*Telephone system added to a clock and program system.*

leased for advancement with the other secondary clocks which have been brought up to the correct time. The program instrument causes electrical contacts to be made at predetermined times so that the current flows to and operates the signal devices. Provision is also made on the master clock for manual operating the entire program circuits. The associated program bell control board may be used to operate any individual signal unit in the system.

A typical riser diagram layout of a clock and program system is shown in Fig. 2. The relative locations of the master clock and secondary clocks, pushbutton control board, audible signals, terminal cabinets and power supply rectifier are shown together with the quantity and the sizes of the conductors and the size of the conduit. The conductors are carried from one floor terminal cabinet to the other, and separate terminal strips are enclosed for the clock system and the audible signal system. Bells are used for the corridors, playrooms, play yard, locker rooms and the engine room. Buzzers are enclosed within the clock cases in the classrooms. There should be two terminal strips in the third floor cabinet, one having three pairs of terminals for the clocks, and one having eleven pairs of terminals for the nine bell and buzzer section wires and the two common power wires, one for the bells and one for the buzzers. The second floor terminal cabinet should be provided with two terminal strips, one having three pairs of terminals for the clocks, and one having 20 pairs of terminals for the 18 bell and buzzer section wires for the second and third floors, and two common power wires, one for the bells and one for the buzzers. The first floor terminal cabinet should be provided with two terminal strips one having five pairs of terminals for the clocks, three for the clocks, and two for the power wires from the rectifier. The other terminal strip is to be provided for the 32 bell and buzzer section wires and two power wires from the transformer with an additional two common wires for the bells and the buzzers. The basement terminal cabinet should be provided with two terminal strips one having three pairs of terminals for the clocks, and one having six pairs of terminals for the six bell section wires and one common wire for same.

Color coded wires should be used for the three wires in the secondary clock circuit. These colors may be black, white and red. Color coded wires should also be used for the program bells and buzzers. The common wires of No. 14 B & S gauge may be blue and yellow. The section wires of No. 16 B & S gauge may follow the color code pattern as suggested in the table shown in the February 1949 issue of this magazine under the heading of Calling System Layout.

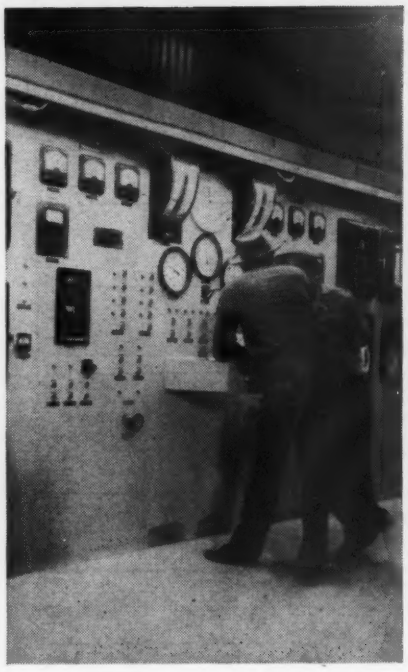
While the system shown in Figures 1 and 2 require three wires between the master and secondary clocks, there are some systems at present which may be operated on two wires between these same points.

It is very desirable in schools to use telephones in classrooms and other locations. Such a system may be added to the clock and the program equipment previously mentioned, and as shown in Fig. 3. The master telephone may be comprised of the bell control board and the addition of a telephone such as a handphone on cradle with a relay and a switch. The outlying telephones may then be connected on two common wires for talking in which case the buzzer in the clocks may be used as a calling signal. In the event that the outlying telephones are to have a separate signal enclosed within the housing, such as a bell or buzzer, it will be necessary to run a common wire to all telephones and a separate section wire to each unit.

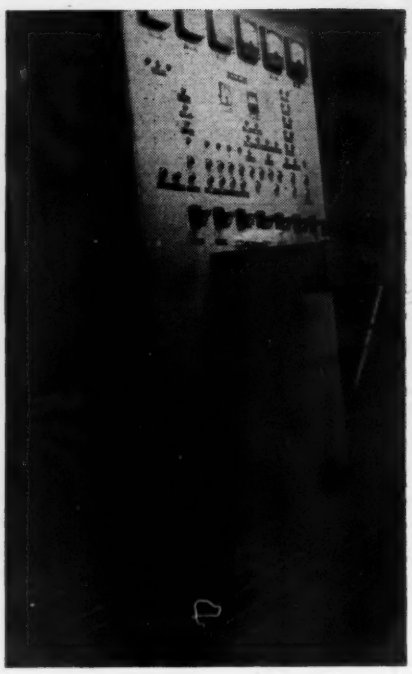
The wiring for the additional telephones should be a twisted pair such as No. 19 B & S gauge for the talking. This is necessary in order to reduce the inductive noises and to obtain clear speech. This is particularly true when the same conduit is used for more than one system and where alternating current is used to operate the program bells and buzzers. The wires for telephones having the self-contained signals may be No. 14 B & S gauge for the common wire and No. 16 B & S gauge for the section wires. If cable is used for such a system the twisted pair type may be used. In addition a separate terminal strip must be used for this system.

The current supply for the telephone system should be derived from a thoroughly filtered power supply unit.

A case study in modern electrification techniques applied to cement manufacturing.



BURNING CONTROL PANEL *holds accurate kiln temperatures to burn slurry.*



MOTOR OPERATION *is centralized for each section of the plant in control panels.*

Cement Plant

THE Ideal Cement Company recently put into operation at Portland, Colorado, a new cement plant that is the last word in cement manufacturing technology. Designed by the Company's engineering staff working in conjunction with the Stearns-Rogers Manufacturing Company, this plant was made as automatic and modern as was possible. The advantages and flexibility of electricity were fully recognized by the designers who incorporated electrical control and drive into the plant wherever possible. Electricity plays a major part in the operation of this modern plant from start to finish. Electric shovels dig the raw product at the quarry, and electric packing machines complete the process by placing the finished product into bags for sale to the consumer. Electrical drive and control are used throughout the entire process, requiring a connected load of some 4000 kilowatts.

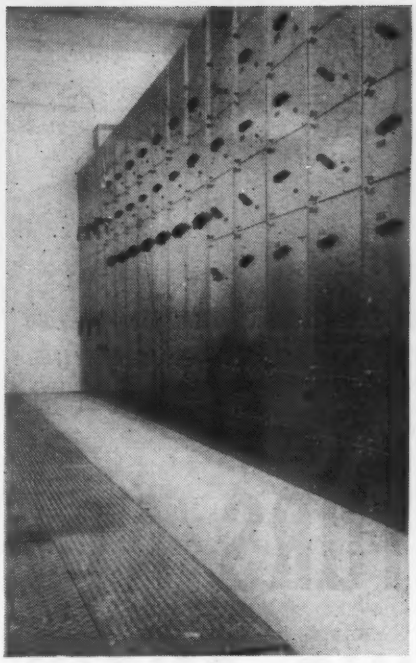
The raw product is obtained from a quarry some 2000 feet from the plant itself. At the quarry the rock is loaded into Diesel trucks with electric shovels and dumped into a crushing plant that reduces the rock to a suitable size for processing in the plant. This crushed rock is transported to the mill by means of a rubber conveyor belt some 1500 feet long that is driven by a 50 horsepower electric motor and which dumps the rock into a storage area. A 12½ ton overhead crane then distributes the rock into feed bins. This crane is a 440 volt three phase a-c unit that operates on a 180 foot runway and is equipped with a yard bucket.

After the rock is placed in the feed bins it moves through automatic weighing and regulating machines known as "Feed-o-weights." These "Feed-o-weights" maintain a constant and uniform rate of flow that is predetermined by the mill operator. This "feed" is then discharged into two 9 ft. 6 in. by 10 ft. 2 in. ball mills known as Raw Mills which grind it to a fine consistency and mix it with water to form "slurry". It is then circulated through large settling and mixing tanks until the proper density is obtained, after which it is fed into a kiln 400 feet long. There are two of these kilns operating in parallel and fired with natural gas at a temperature of around 2600 degrees. These Kilns burn the slurry into a clinker which is then cooled and ground into cement in an 8 ft. by 40 ft. ball mill known as the Finish Mill. The plant has two of these Finish Mills that operate in parallel.

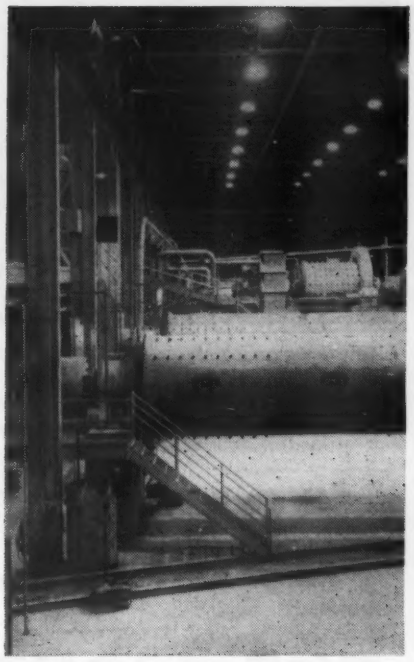
Basically the process is divided into four (4) stages, namely: Raw Grinding, Thickening, Burning, and Finish Grinding. Three Control Panels are provided from which the Raw Grinding, Burning, and Finish Grinding can be operated. The start buttons for the motors in the thickening section were installed at the various motors, and there is no central control panel for this department. In the case of the other three departments the operator can control all of the equipment in his section directly from the control panel. This panel contains the start and stop buttons, ammeters on the motor circuits, ground detector lights, indicating lights, and selector switches for that section of the plant. The burning control panel also has the necessary temperature recording instruments, automatic draft controls, gas pressure gauges, oxygen analyzers, etc. to insure proper combustion of the kilns. A very accurate control is maintained of the kiln temperature to secure efficient burning of the "slurry".

All of the motor starting equipment was grouped together in the main substation and four Unit Substations which feed the four operating departments of the plant. No motor starters are located out in the plant itself. The starters for the four ball mill motors are located in the main substation building; otherwise all motor starting equipment is located in the unit substation for each particular department. These unit substations are alike and consist of a 1000 kva. three phase air-cooled oil-insulated 4160 to 460 volt transformer that feed a cabinetrol containing about 40 motor starting switches. The transformer is placed outside the cabinetrol room, power being fed to the cabinetrol by means of a metal-enclosed copper bus. A 440 volt three pole air circuit breaker is provided as an incoming breaker on the bus to protect it against short circuits. Each motor circuit is protected by an individual air circuit breaker and a magnetic motor starting switch with overload relays. The cabinetrol

UNIT SUBSTATION TRANSFORMERS *are located outside the switchboard room.*



THE MOTOR CIRCUIT CONTROL *is grouped at unit substation.*



A PLANT BAY *showing lighting and two of the large motor applications.*

Electrification

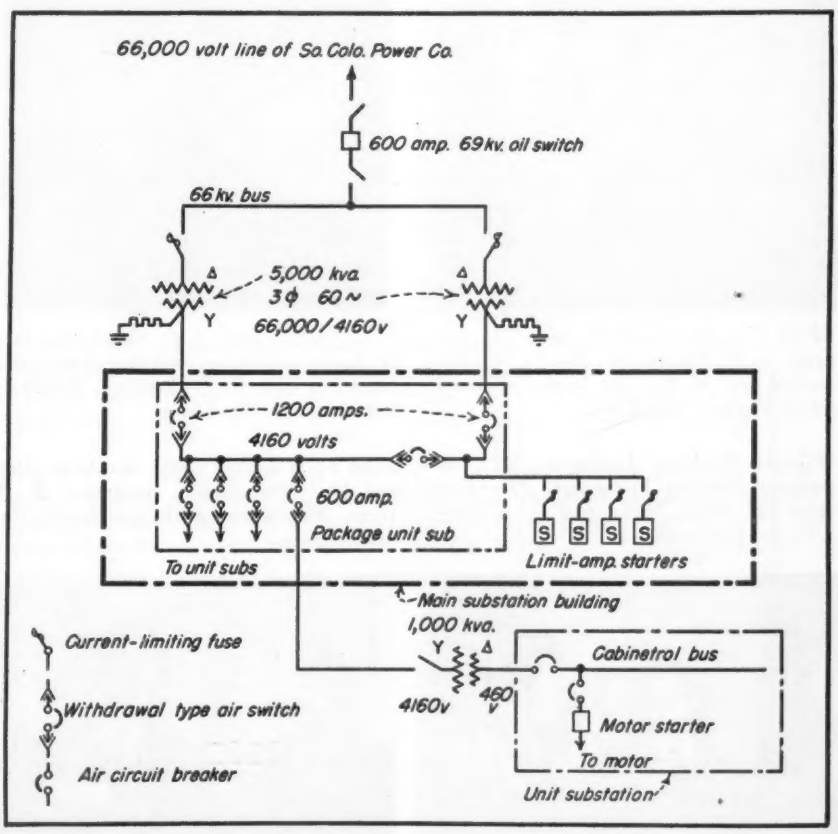
By William P. Reese
Chief Electrician
The Ideal Cement Co.

is completely metal-enclosed, dead front, with a baked enamel finish.

This grouping of the motor starters had several distinct advantages, one of the more important being the elimination of dust. While every effort was made to keep the plant as dust-free as possible it was felt wise to install the electrical equipment in concrete vaults. These vaults are kept under a positive air pressure by blowers, thereby keeping dust out of them. These vaults have no windows, and every effort is made to maintain an effective air-seal against the entrance of dust.

The power circuits from the cabinetrols to the motors are lead-covered varnished cambric wire placed in metallic conduits. This type of wiring provides protection against circuit failures due to moisture. The fact that the motor starters are all installed in the unit substations and the control buttons on the control panels, made a large number of control circuits necessary. These were also made up of lead-covered wire in metallic conduit. Terminal boards were installed at each end of these control circuits, and each wire was identified by tags in accordance

(Continued on Page 173)



ONE LINE DIAGRAM *of service and power distribution.*

L. W. Ferguson, sales mgr., Wheeler Reflector Co.; E. C. Pond, electrical contracting division, Dowagiac Lumber & Coal Co., Dowagiac, Mich.; C. E. Robison, Jr., Wheeler Reflector Co., Huntington, W. Va.; Don Bertke, Bertke Electric Co., Cincinnati, Ohio; and G. D. Rose, Dowagiac L & C Company.

Virgil Zippel and John Van Ness of Van Ness Electric Co., Valparaiso, Ind., inspect new Holophane lenses.

CONTRACTORS AT THE LIGHTING SHOW

By virtue of their installation know-how and engineering talent, electrical contractors occupy a key position in the planned lighting program. Evidence of their continuing, keen interest in the technical progress and market potential of the expanding lighting industry was their attendance at the Third International Lighting Exposition and Conference held March 29-April 1 at the Stevens Hotel in

Clyde W. Lint, Clyde W. Lint Co., Chicago; E. B. Oberlander, Peoria, Ill., contractor and M. D. Nutt (right), Corning Glass Works, New York.

S. C. Sachs (left), S. C. Sachs Co., Inc., St. Louis contractor, sketches some lighting ideas with H. J. Poehling, Day-Brite Lighting, Inc., St. Louis.

Douglas Bunting, Jr., Unistrut Products Co., Chicago; L. A. Parker, Barker-Fowler Electric Co., and J. D. Malnight, Bd. of Water and Elec. Light; Lansing.

William Hepburn, Lexington, Ky., contractor; Stephen Furbacker, The Kawneer Co., Niles, Mich., and G. A. Rafel, Chicago contractor.

John O. Kvalsten (left), Kvalsten Electric Co., Minneapolis, contractor B. R. Bunn, Westinghouse Electric Supply Co., Minneapolis.

Wayne Cook, Virgil Cook Electric Co., DeKalb, Ill., and R. V. Carrier, R. V. Carrier & Co., Chicago Heights, Ill., A. E. Swedenborg, Benjamin Elec. Mfg. Co.

Ray Ashley, NECA Research Director, Chicago, chats with W. B. Schnorbus, Houston, Texas contractor.

O. L. Barnes and M. L. Barnes, Barnes-Joy Engineering Co., Lima, Ohio, scan Wiremold literature.

Ken Meyer, Wilson Electric Co., Rockford, Ill., and H. E. Burkhardt, Meade Electric Co., Chicago, meet at the show.

Chicago. Many contractors brought their key engineering and sales personnel; others even had their top flight journeymen and apprentices.

The Exposition, sponsored by the Industrial and Commercial Lighting Equipment Section of the National Electrical Manufacturers Association, drew a selected attendance of 7,000 contractors, maintenance men, engineers, lighting specialists, architects, wholesalers and manufacturers' representatives. It presented in 143 booth spaces, the product exhibits of some 77 manufacturers of lighting equipment and component parts, trade publications, trade and technical associations, and all winning entries of the Merit Award Competition.

Of the 220 awards, electrical contractors tallied three Gold Seal awards and 19 Merit Award Certificates in the nation-wide industry contest. The importance of planned lighting layouts in selling and producing high quality illumination results was demonstrated in the superior quality of entries in this year's competition.

Capacity crowds also attended the four conference sessions. One was of general interest to all registrants. The others were directed to specific wholesaler, utility and contractor audiences.

H. L. Brannan, supt., Hatfield Electric Co., South Bend, Ind.; E. G. Morehouse, electrical engineer, Studebaker Corp., and K. G. Herder, Leader Electric Co.

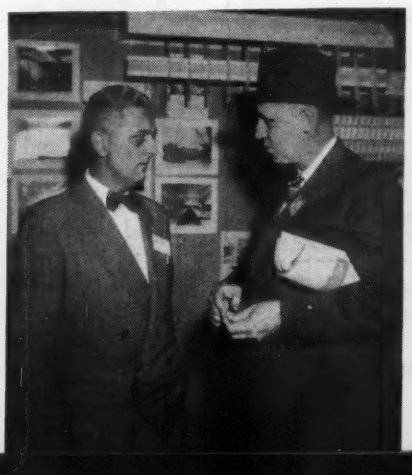
James Smyth (left), James Smyth Electric Co., Marshall, Mich., brought his apprentice Ed. A. Bailey to see latest lighting developments.

In Merit Award booth are (L to R) Harry Burroughs, Electrical Engineering Bureau, Inc.; F. H. Oppitz; and H. C. Adolphsen—all Milwaukee contractors.

Earl Stumpf, Gamp Electric Co., St. Louis; George K. Staff, Staff Electric Co., Milwaukee; Leo H. Gamp, Jr., and L. M. Millholin, Jr., Westinghouse.

Edward J. Wolff (left) Bueter & Wolff, Chicago consulting engineers; and Frank E. Vogel, president, Edwards Electric Co., Chicago contractor.

Jack A. Frost, Detroit contractor; Fred Johnson, electrical engineer, General Motors Corp., Detroit; and S. B. Stoler, Hecker & Co., Inc., Chicago contractors.

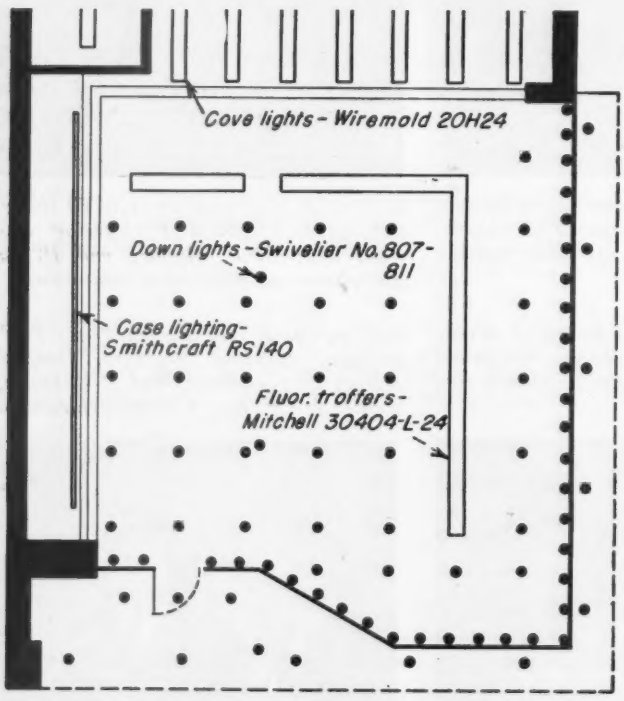


CONTRACTORS WIN . . .

GOLD SEAL LIGHTING AWARDS

Three Planned Lighting installations earn coveted Gold Seal Awards for Electrical Contractors in Merit Award Competition at the 3rd International Lighting Exposition

FLUORESCENT AND INCANDESCENT LAMPS *are skillfully combined to provide an artistic setting for flower displays.*


Cove lights - Wiremold 20H24
Down lights - Swivelier No. 807-811
Case lighting - Smithcraft RS140
Fluor. troffers - Mitchell 30404-L-24

PLANNED LIGHTING LAYOUT *shows four types of lighting equipment used to create the colorful lighting result.*

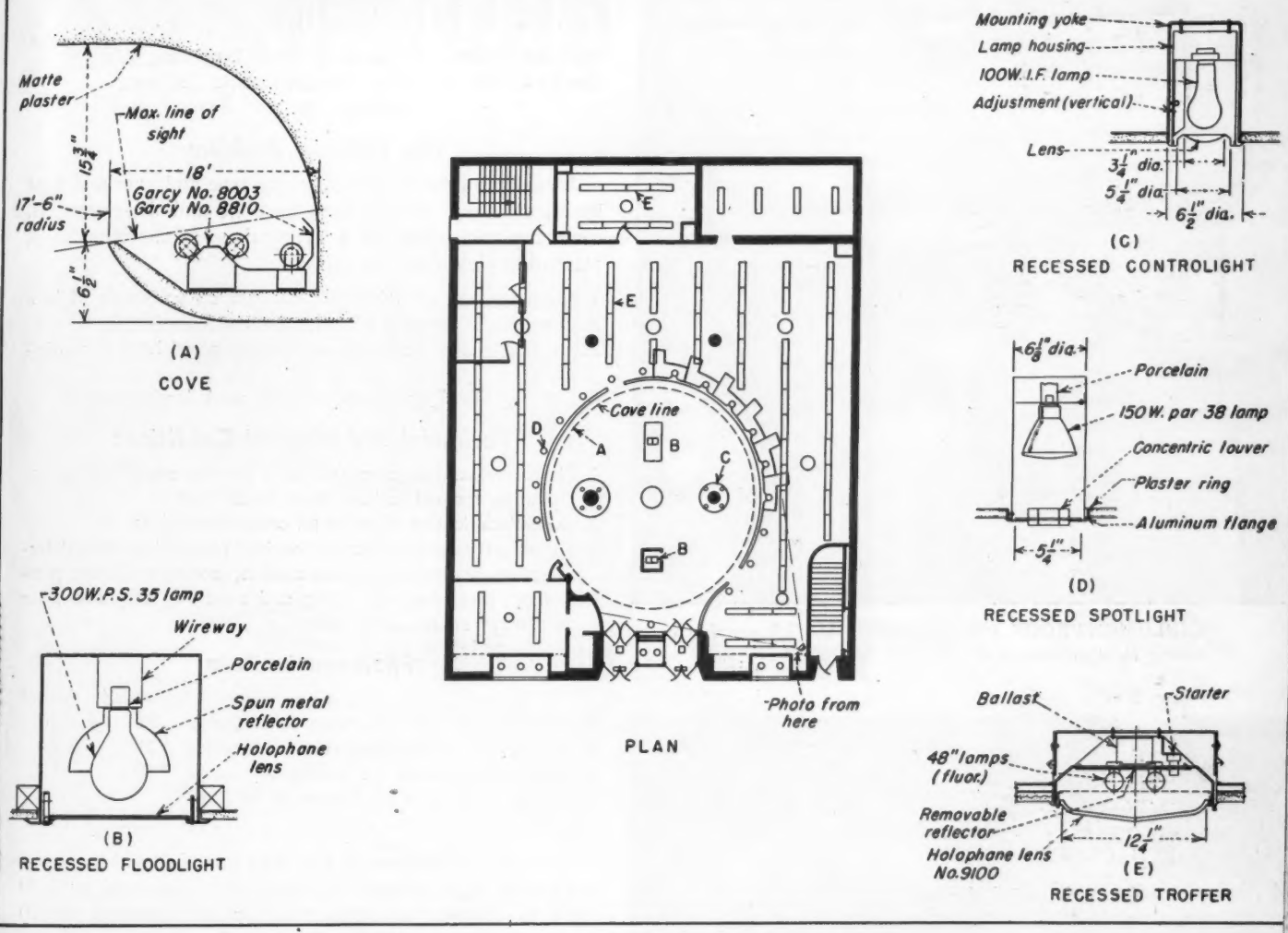
PLANNED LIGHTING IN A FLORAL SHOP

INSTALLATION—Cedar-Lake Floral Company
Minneapolis, Minn.
CONTRACTOR —John Christianson Electric Company
Minneapolis, Minn.

What the owner says about this new Planned Lighting job. . .

"It has been a tremendous success. Favorable comments have come to us from many sources—our regular customers, those who pass by our place in the street cars, and those just driving by. They all tell us what a perfect lighting scheme it is, how the down lights shine like stars, how the lights in the Frigidaire show off the flowers, and what a perfect setting the indirect lighting is in the shadow boxes for our gift ware. They all agree that it is a pleasure just to drive by and look at the store.

"We feel that your work for us in setting this all up will materially increase our business. We know that it has added much beauty to our shop and that it is a pleasure for us to work in it. Also, the fact that this new lighting system causes our customers and friends to notice us is considered very valuable as advertising."



MAIN BANKING ROOM *showing Planned Lighting layout, using five types of lighting equipment and two types of light*

PLANNED LIGHTING IN A BANK

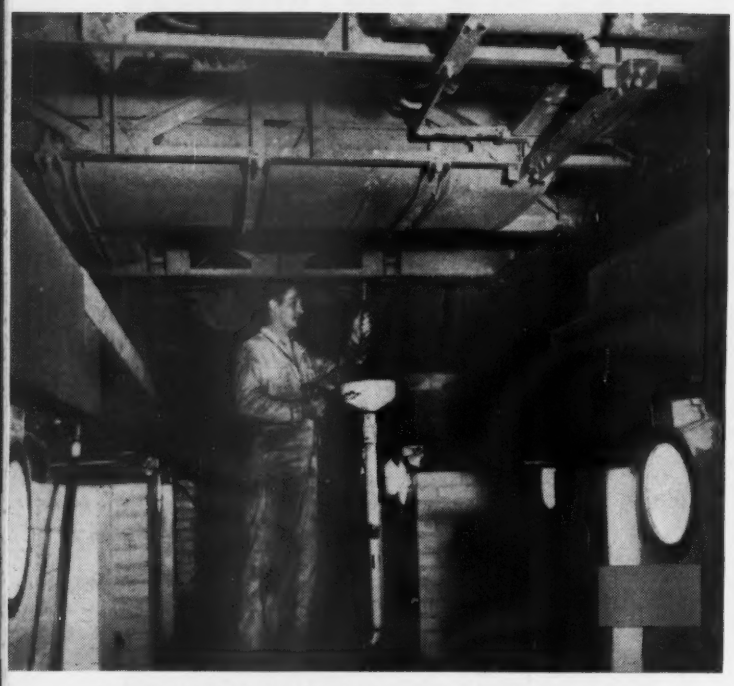
INSTALLATION—First Federal Savings & Loan Association
Minneapolis, Minn.
CONTRACTOR —Kvalsten Electric Company, Inc.
Minneapolis, Minn.

What the owner says about this new Planned Lighting job. . .

"We do not know of any area [in this community] that is so well lighted as ours. It appears that lighting has been so arranged that shadows are completely eliminated, and we have absolutely no comment whatever from our employees with respect to shadows falling on their desks or writing surfaces. This has been particularly important with our tellers who, in our previous location, constantly complained of such shadows and making it difficult for them to operate. The soft quality of fluorescent lighting is much appreciated, and we, naturally, appreciate also the fact that we are getting the maximum footcandles on our desk surfaces for minimum cost.

"Because of the lighting effect in our institution, the interior of our offices has become a sort of showplace for the business community of this city."

FLUORESCENT COVE AND TROFFER *general lighting is combined with functional lighting over deal plates and check counters.*



EXPLOSION-PROOF PIT LIGHTING UNITS *provide asymmetric light pattern to evenly light bottom of buses.*

MAINTAINED LIGHTING LEVEL *is 24 footcandles on under side of bus with 200 w lamps in No. 3002 Revere lighting units.*

PLANNED PIT LIGHTING

INSTALLATION—Maintenance Shop, Lynchburg, Va.
CONTRACTOR —Hudson-Morgan Electric Co., Inc., Lynchburg, Va.

The Lighting Problem

A common carrier operating city type and overland type buses, each type having both gasoline and diesel models, desired Pit Lighting for a Preventive Maintenance Shop, planned to yield these results:

1. Adequate and even intensity of light on underside of bus.
2. Complete elimination of extension cord auxiliaries.
3. Shadow interference from working personnel held to a minimum.
4. Lighting MUST accommodate peak work loads at night.

Technical and Physical Conditions

1. No recommended footcandle level for this exact type of installation seemed to have been established.
2. Code classification of entire pit area—hazardous.
3. Permanent type construction involved required positive determination of maintained footcandles, accurate fixture positioning, and complete wiring and switching diagrams prior to start of actual construction.

Photometric Data

	Estimated	Actual
1. Initial footcandles on underside of bus..	25	30
2. Maintained footcandles on underside of bus	20	24
3. General brightness in footlamberts....	10	12
4. Surface brightness of fixture in footlamberts	1250	1500

General illumination in the area containing these service pits is approximately 15 footcandles, provided by 2-40 watt fluorescent industrial reflector units spaced on 10 ft. by 15 ft. centers, 12 feet from the floor.

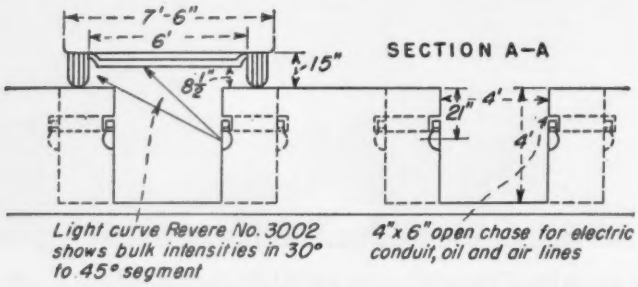
Contractor Benefits

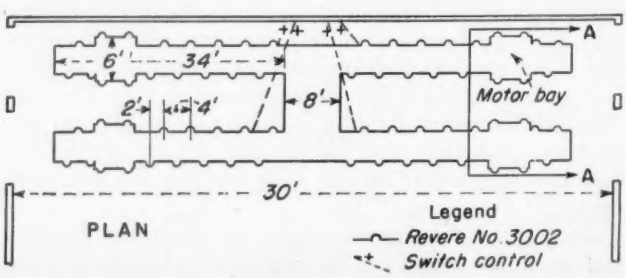
1. This job was let without competitive bid because of contractor's ability to PLAN the pit lighting.
2. The acceptance of the basic pit lighting layout (price $2800.00) with its imposed additional wattage led directly to the following:

a. New 400 ampere lighting service.....	$3,000.00
b. Secondary 200 ampere power service.....	1,200.00
c. Ventilation system for pits.....	1,000.00
Total	$5,200.00

Customer Benefits

The customer states that an overall increase in efficiency of some 33 percent in this operation has been noted since remodeling. The pit lighting is considered responsible for a high proportionate share of this increase.

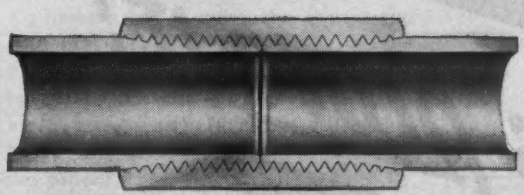




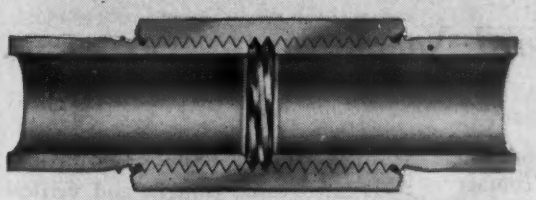
LIGHTING LAYOUT DETAILS *shown in plan and elevation for bus service pit lighting.*

SHERARDUCT GIVES WIRING

FORTIFIED PROTECTION



SHERARDUCT COUPLING—All surfaces and threads are Sherardized. Accurately undercut threads permit completely closed joints—no raw threads exposed—no gaps to interfere with the easy fishing of wires.



ORDINARY COUPLING—Raw threads meet raw threads—accelerates rust—weakens joint. Threads exposed in gaps trap wire ends and make the fishing of wires difficult.

- It's the Sherardizing process that *fortifies* SHERARDUCT against rust and corrosion. This process drives a pure zinc dust coating into the steel surface —alloys the coating to the steel wall.
- Still further protection is provided by the baked-on Shera-Solution coating that *seals* the zinc—fortifies SHERARDUCT against acids and other corrosive agents.
- Smooth inside surface makes fishing easy.
- SHERARDUCT is a full weight, threaded, rigid steel conduit.
- *It's fortified for life-time protection!*

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Motor Shops

Adjustable Device Forms Wound Rotor Coils

Slip ring motor application is so general today that most motor repair shops have a large number of these units to rebuild and service. However, rotors of slip ring motors present some winding problems. Rotor windings might be divided into two groups: the threaded-in or mush type; and the bar wound type which may be either wave or lap connected.

The motor repairman could use to advantage an adjustable coil making machine to shape these bar coils. William C. Bedoit of the Chattanooga Armature Works, Chattanooga, Tenn., has designed and built such a unit. Entered in the 1948 NISA Award Contest, his design received honorable mention and is published through the courtesy of the 1948 Awards Committee of the National Industrial Service Association.

A sectional view of the bench-mounted machine is shown in Figure 1. To make a set of coils, the gap in the coil table (2) is covered with the proper plates to give the right slot length to the coil (see Fig. 2). The brake arm, which turns on adjustable hinge pin (14) is adjusted to give the proper length to the coil offset by turning adjusting screw (17) as shown in Fig. 3. The brake arm is then lowered to a horizontal position; the coil placed on the coil table and under clamp (10) which is adjusted by turnbuckle (11) to accommodate various thickness of copper bar. Rod gauge (8) is then adjusted for proper coil length. Crank (13) is on an eccentric and when turned down clamps the coil securely in position on the coil table.

After stop nut (12) is adjusted by turning crank (4) to provide the proper brake-arm angle, all is set to form the coil. An upward pressure on handle (16) rotates the brake arm until end of handle bar drops in front of stop nut (12). Clamp (9) is then tightened by turning wheel (6) and the coil end tamped over end-table (18) which has been previously adjusted by inserting pins in bar (7) to provide proper angle to the end lap. One end of the coil is now formed. After turning and swinging gauge (8) out of way and loosening brake-arm and coil table clamps, the coil can be removed.

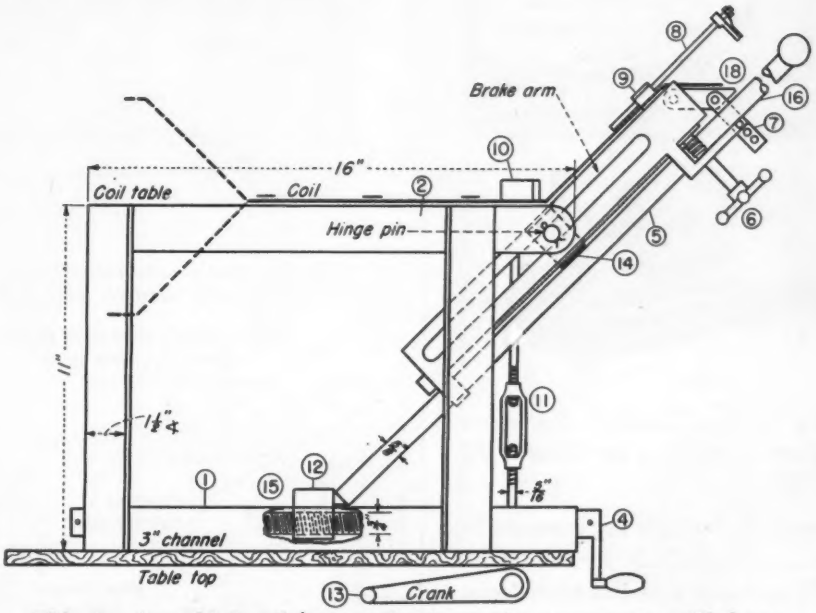


FIG. 1—Assembled coil former showing main components: (1) base; (2) coil table; (5) brake arm; and (18) coil end table. Heavy line on coil table represents coil being formed.

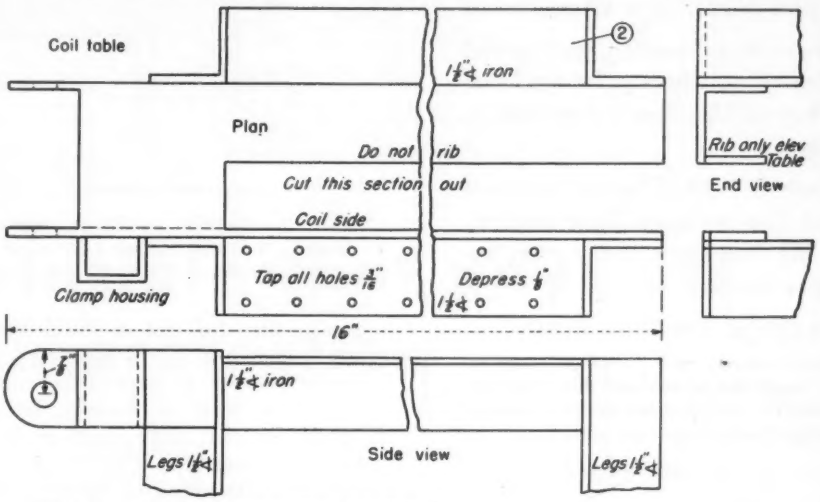


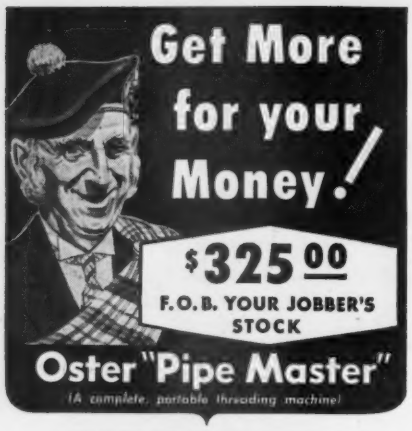
FIG. 2—Coil table construction details.

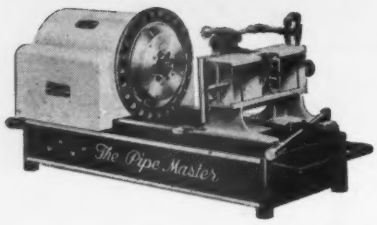
An entire set of coils is formed on one end before the other ends are formed (if necessary).

Any necessary curve in the throw of the coils is made by using the forming block (25) shown in Fig. 4. This iron block is about 4 inches long, 2 inches wide and 3 inches high. The sides are ground to different radii according to curve desired. Coil ends are laid on the block and tamped with a mallet until they conform with the contour of the side of the block. The coil maker may mark the wire to give the coil taper a starting point for the tape.

Design and construction details are presented in the accompanying drawings. The base (1) shown in Fig. 1 is made of 3-inch channel iron. A slot is cut into it to permit stop nut (12) to travel back and forth to set the angle of the brake arm. Crank (4) is pinned to screw bar (15) which, when turned, moves the stop nut. This slot and nut are directly under handle bar (16) of the brake arm. Four 1½-inch angle-iron legs supporting coil table (2) are welded to both the table and base channel.

Coil Table Details appear in Fig. 2.





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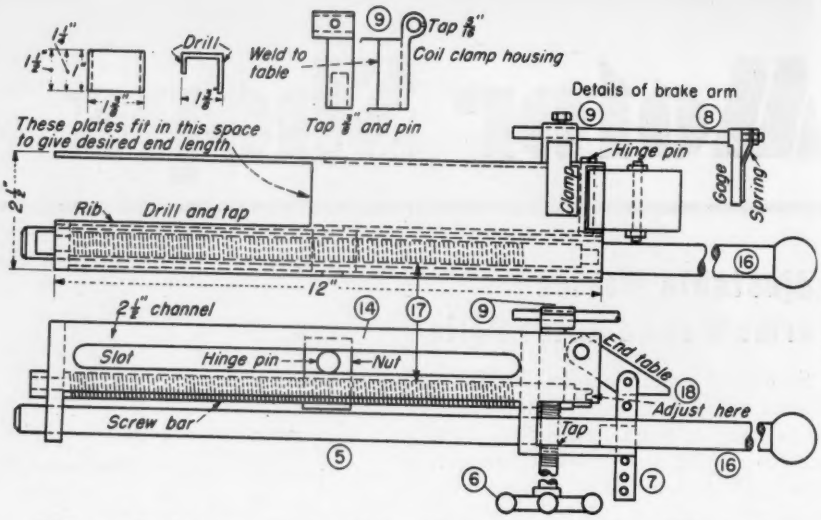


FIG. 3—Brake arm construction and assembly details. This is the component that actually forms the coil.

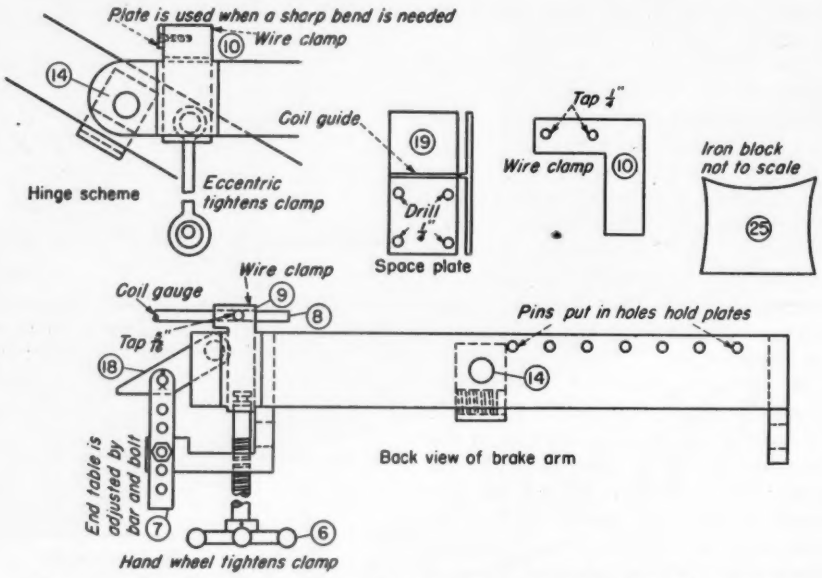


FIG. 4—Details of hinge joints and coil end table; including guide plates on brake arm and forming block for putting necessary curvature in coil throw.

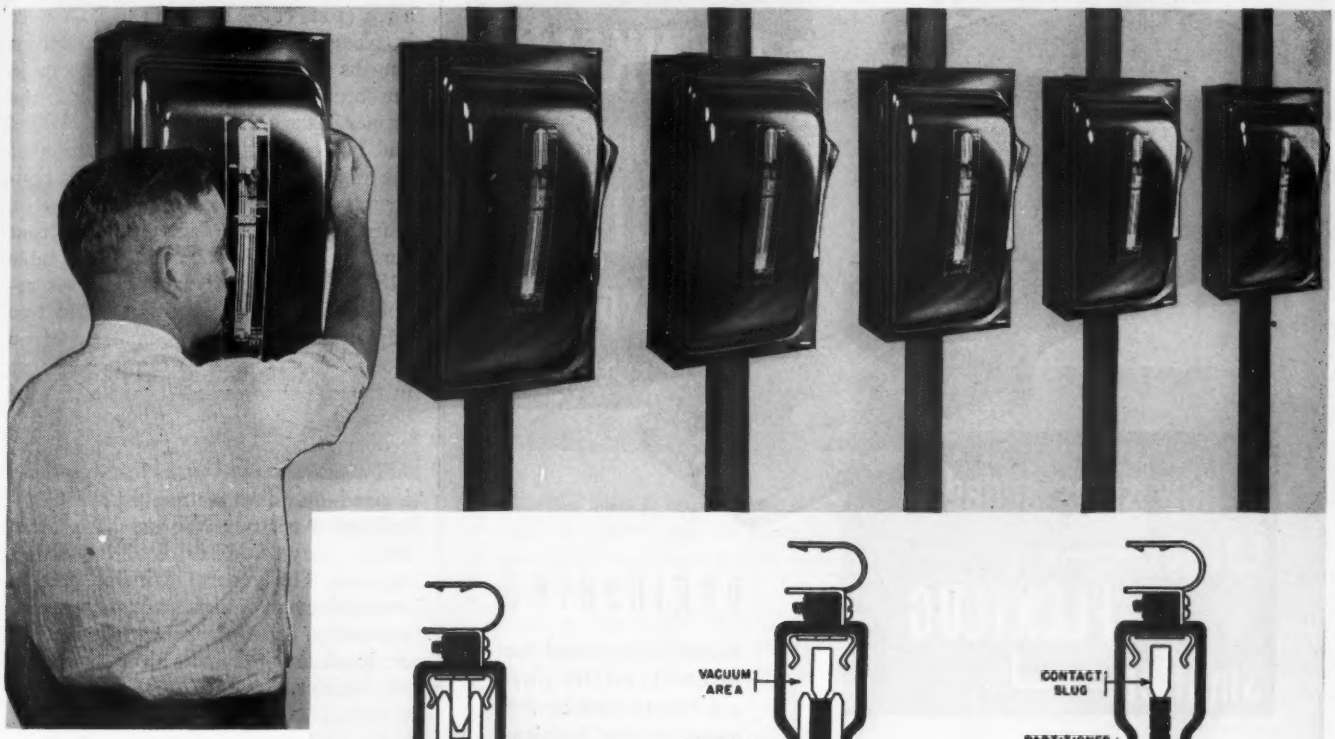
A gap or throat is cut in the 3-inch channel (see plan). A section of 1½-inch channel is welded between the legs. The front of the channel is cut away for the hinge joint of the brake arm. Clamp (10) slides in a box-like housing; is raised or lowered by turning crank (13); is adjusted to hold coil firmly when crank (13) is in "down" position by turning turnbuckle (11). The clamp grip is secured by an eccentric, although the slower screw and hand wheel combination may be used.

Brake Arm Details are shown in Fig. 3. Arm is made of 2½-inch channel with a gap cut into it similar to that in the coil table. A rib is welded under the edge of the gap and drilled and tapped so that the plates shown may be inserted and held in place by long screws. These plates are level with the rest of the arm when inserted. On the one side of the arm, rigid supports are welded to hold the screw bar and hand bar. The screw bar has a slot for screw driver adjustment, although it could be made to accommodate a special wrench. The other end of this screw is turned down and inserted in the supporting hole. A pinned collar holds it securely in place.

Hinge nut (14) is made of good grade steel; is drilled for the hinge pin and tapped to fit the screw bar. The nut is held stationary by the hinge pin. Turning the screw bar moves the brake arm back or forth and changes its effective length to correspond to specified coil length.

Wire clamp (9) is raised or lowered by turning hand wheel (6); is drilled to hold wire gauge rod (8) which is held in place by a bolt. The gauge is a flat bar, free to turn on its rod and held in position by a nut as indicated. End table (18) swings on a

This message will also appear in a broad list of publications that are read by the men you seek to influence . . . your prospective customers



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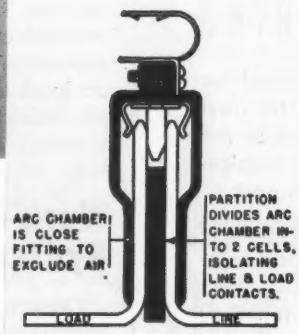
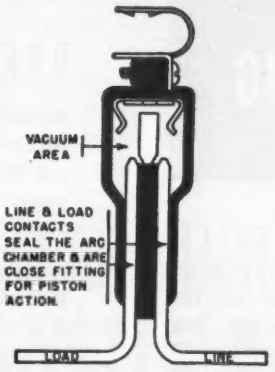
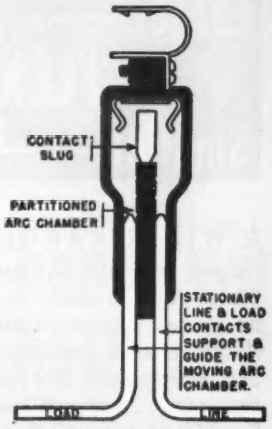

ARC CHAMBER IS CLOSE FITTING TO EXCLUDE AIR
PARTITION DIVIDES ARC CHAMBER INTO 2 CELLS, ISOLATING LINE & LOAD CONTACTS.
LOAD
LINE

IN FULL "ON" POSITION, the partitioned arcing chamber carries the free-floating contact slug in perfect alignment between the "LINE" and "LOAD" contacts. The "Clampmatic" pressure springs assure contact tight as a bolted connection for cool, efficient operation.



RUPTURING THE CIRCUIT, the quick outward movement of the housing on the close-fitting stationary contacts creates a piston action, reducing the amount of air in the arcing chamber. Simultaneously, magnetic blow-out force throws the arc away from the contacts and against the chamber walls for final dissipation.



IN FULL "OFF" POSITION, the stationary "LINE" and "LOAD" contacts remain partially inserted in the enclosed arcing chamber, effectively sealing them against dust and dirt.

Switch principle that pays off in protection

WHAT makes these safety switches really safe?

The answer is simple: They are BullDog Vacu-Break Safety Switches, and utilize an exclusive principle of arc control and positive contact.

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The Vacu-Break arc-snuffing principle ends excessive burning and pitting of contacts, thus greatly reducing maintenance and prolonging switch life.

Another feature of BullDog Vacu-Break Safety Switches is patented "Clampmatic Contacts." Strong metal "fingers" close tightly on contacts when switch is thrown ON. Power flows smoothly through silvered-copper conductors; bolt-tight connection keeps contacts cool for efficient operation.

You will want to see a BullDog Vacu-Break Switch in operation. Call your nearby BullDog Field Engineer . . . he will be glad to show you an installation in your neighborhood.

BullDog Field Engineers welcome the opportunity to sit in with you in the early planning stages of a building project. Their knowledge of electrical distribution layout can mean savings in installation costs, as well as efficiency and reliability in actual operation. Why not take advantage of this service?

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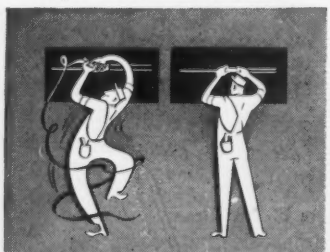

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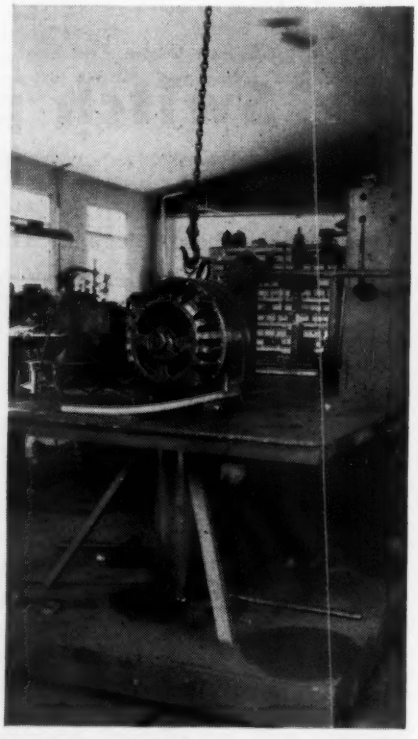
hinge pin and is supported by a pair of adjustable link bars (7).

Hinge Details are shown in Fig. 4. Space plates (19) are flat plates with a rib (pins could be used) to hold wire in place. Plates are made in different lengths and used to bridge the gap in the brake arm to give the coil the proper length. The plates are drilled and tapped as shown. That section of the angle with the tapped holes is constructed low enough so that plates, when installed, are level with the front surface of the coil table. End table (18) can be raised or lowered as required by inserting pins in the two adjustable link bar supports. Iron block (25) is used to tamp the curve in the coil throw; has its sides ground down to different radii to provide proper curvature in the coil.

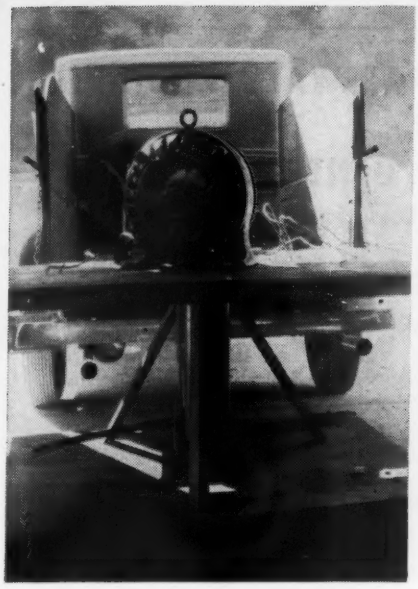
Thousands of coils have been formed on this machine in the Chattanooga Armature Works shop. Other shops may find it equally advantageous. The general principle can be retained even though changes may be necessary to conform with materials on hand and the individual desires of the builder.

Work Table Hydraulic Lift

Gory Electric Service, Los Angeles built this mobile, adjustable-height work table in its own shop. The lower steel platform, three by four feet, is mounted on 6-in., swivel casters. A



The motor is lifted onto the table by chain hoist.

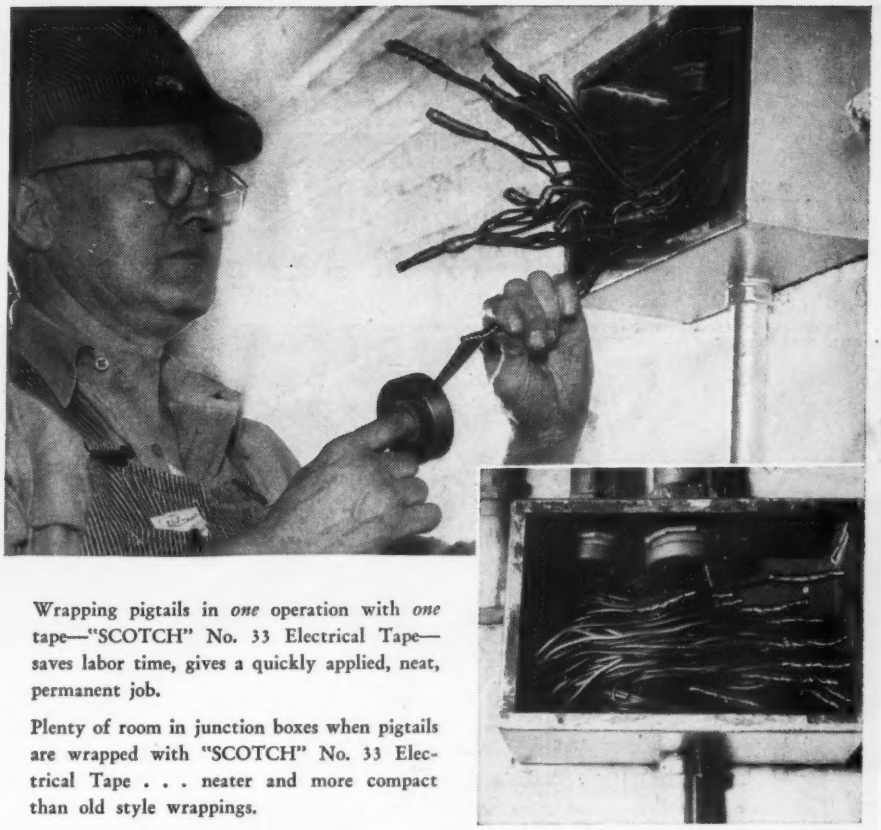


Work completed, table is rolled out to the truck and adjusted to truck bed height.

6-in. hollow steel column is welded to the center of the platform, and a steel shaft operating inside of the column carries the steel work table on the top end. The shaft is raised by means of a 5-ton automobile hydraulic jack mounted under the lower end of the shaft, and set in position through an opening cut in the side of the steel column. The total lift is about 13 ins.

The rig is especially convenient because the large, easy-rolling casters permit it to be moved anywhere in the shop. Motors are lifted onto it by means of the chain hoist. The height is easily adjusted to the work, and when this is completed the table is rolled out to the doorway and adjusted to truck bed height, and the motor slid off onto the truck.

Oversize terminal box provides plenty of room for making connections to this 200-hp., 250-volt d-c motor on mill room floor of ALCOA's new Davenport plant. The 30" x 30" x 18" aluminum enclosure replaces the original 18" x 18" x 6" terminal box; gives ample area for training and taping the six 1,000MCM aluminum cables feeding motor.



Wrapping pigtails in *one* operation with *one* tape—"SCOTCH" No. 33 Electrical Tape—saves labor time, gives a quickly applied, neat, permanent job.

Plenty of room in junction boxes when pigtails are wrapped with "SCOTCH" No. 33 Electrical Tape . . . neater and more compact than old style wrappings.

No crowded junction boxes with this PLASTIC-BACKED TAPE

Here's the tape for faster, cleaner splicing jobs—and for a wide range of other uses in electrical construction and repair. "SCOTCH" No. 33 Electrical Tape gives you complete electrical insulation, thorough mechanical protection. Try "SCOTCH" Electrical Tapes in your work. A letter to Dept. EC-4 will bring complete information and a trial roll—you will be under no obligation. Write today.

QUICK FACTS ABOUT
"SCOTCH" No. 33 Electrical Tape

• Tough, impervious plastic backing • Stretchy, conforms to odd shapes • High dielectric (over 7,000 volts) • Thin caliper (.007 in.)

ANOTHER 3M COMPANY PRODUCT

SCOTCH BRAND No. 33 Electrical Tape

Made in U. S. A. by

MINNESOTA MINING & MFG. CO.

Saint Paul 6, Minnesota

General Export: DUREX ABRASIVES CORP., *New Rochelle, N. Y.*
In Canada: CANADIAN DUREX ABRASIVES LTD., *Brantford, Ontario*

You know you're right with "G-E White"

1. Tough, baked-on Glyptal* lacquer finish outside
2. Hot-dipped zinc outside
3. High-grade steel
4. Hot-dipped zinc inside
5. Tough, baked-on Glyptal lacquer finish inside

5 WAY WIRING PROTECTION

These are five of the reasons why General Electric white rigid conduit is such a general favorite with electrical contractors and maintenance men everywhere.

Always, when you think of conduit for protection from atmospheric corrosion, think of "G-E White." For further information, see your nearest General Electric Construction Materials distributor, or write to Section C21-518, Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

*Trade-mark Reg. U. S. Pat. Off.

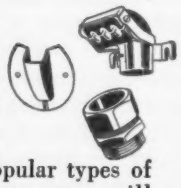
RACEWAYS ROUNDUP

with your

GENERAL ELECTRIC

Construction Materials Distributor

Where chemical corrosion is a threat to wiring, specify General Electric black rigid conduit. "G-E Black" is made from the same high grade steel as "G-E White." "G-E Black" is treated with a protective coating of tough, black enamel, baked on at high temperature. This hard, glassy-smooth finish makes wire pulling easy, and is an excellent paint base.



Service entrance cable fittings in a wide variety are available from General Electric. This line includes a large selection of the popular types of waterproof entrance caps, sill plates, cable straps and watertight connectors.

If you're wondering how to get raceway protection for wiring in cramped quarters, for machine tool or temporary wiring, General Electric flexible steel conduit is the answer. This conduit is strong, yet very flexible. It's quickly installed, and the zinc-coated strip steel is wound in a way that makes wire pulling easy.

Your General Electric distributor can save you lots of time and trouble when you order wiring materials. Because he carries the complete General Electric line, you can order every item you need from him. One order does it — no running around getting part of your order in one place and part in another. It's the kind of "one-stop, one-package" service busy contractors need to help stretch scarce working hours.

GENERAL ELECTRIC

Conduit Products

BRIEF ARTICLES about practical methods of installation and maintaining electrical wiring and equipment and up-to-date estimating and office practices. Readers are invited to contribute items from their experience to this department. All articles used will be paid for.

Practical Methods

Two-ton truck, fitted with sectional, heat treated seamless steel derrick, and winch which is controlled from the driver's cab, is fitted with locker-type body specially constructed for electrical contractor Edward J. White of Newark, N. J. Pole setting, transformer handling, cable pulling and equipment moving are some of the special uses for this rugged service unit.

Derrick and Winch Broaden Truck Use

CONSTRUCTION

Electrical contractor Edward J. White of Newark, N. J. has added another truck to his service fleet; a truck planned and equipped for heavy electrical jobs, such as pole setting, transformer handling, cable pulling and equipment moving. Realizing that only by combining specific equipment can exact requirements be obtained, the White organization made a comprehensive survey of available truck bodies, auxiliary winches, adjustable derricks, extension ladders and heavy duty equipment before writing their specifications. The resulting assembly, therefore, fulfills definite needs and makes positive contributions to White service.

In selecting a chassis, thought was given to wheelbase, tire size, body length, turning radius, engine horsepower, gear ratios and gross weight ratings. Since the purpose of the new truck was to serve the medium and light-heavy classifications of service, a GMC chassis in the FC-300 series was finally selected, having 6 cylinders, four speed synchromesh transmission, a turning radius of 33 feet and an overall length of 21 feet. Unloaded, the chassis weighs 2 tons and is capable of carrying twice that weight.

Mounted directly behind the driver's cab, a Gar Wood winch is mounted, with an automatic safety brake on the worm shaft and the winch shaft extended on the right side of the truck to drive a detachable outboard winch head when required. On the winch drum, 300 feet of $\frac{3}{4}$-inch cable is wound, with a standard hook spliced with a thimble on the extreme end.

Lifting and pulling is facilitated by a seamless steel tubing framework which can be assembled to form a heavy-duty pole derrick or disassembled and stacked in a special truck rack. With individual sections less than ten feet in length, the stacked lengths do not extend beyond the front or rear of the truck body and, since the entire derrick assembly weighs less than 650 pounds, the members can be easily handled by the truck driver and one assistant if necessary. In setting up the derrick, five possible positions can be selected, three with the middle leg anchored in the truck chassis and two with the middle leg placed on the ground behind the truck. With this selection, the ball bearing head sheave can be positioned 22 feet above the ground for maximum height, or it can be positioned 13 feet behind the truck's rear skid rail for maximum reach. Maximum vertical pull, of course, is with the middle leg resting on the ground, and in this position the rig will lift a total weight of 5 tons. When the derrick is supported solely by the truck body, supporting jacks can be lowered into position beneath the rear end to relieve the springs and tires of excessive weight during lifting. Since jacks are adjustable to the ground level and are hinge-mounted so that they can be carried in chain slings when not in use, they constitute convenient, versatile auxiliary supports.

To the rear of the truck, there is also a socket which receives a universal sheave block fitted with two shanks at right angles to each other. This permits cable being pulled in different directions directly from the truck without the use of snatch blocks, for the bottom shank is locked into the socket when a vertical pull is required, and the side shank is used for horizontally pulling cable from either side.

All equipment was furnished and installed by the Northern New Jersey Equipment Company, and the special body—combining bins, racks and lockers—was specially constructed by DeRosa and Sons of Belleville. A wide assortment of tools, wire grips, jacks, coffin hoists, shovels, extension ladders and similar equipment is compactly and securely carried in compartments designed for that purpose.

Already the truck has been used setting 65-foot poles, setting transformers and underground cable work, and has proved invaluable in speeding construction and lessening physical fatigue.

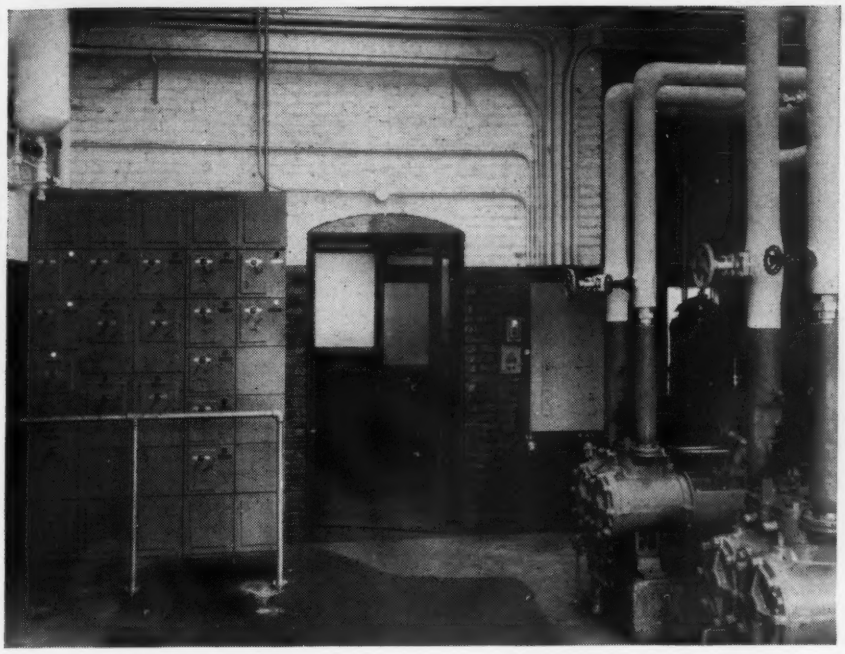
For More Than Sixty Years

CRESCENT WIRES & CABLES

Have Played A Leading Role In The Growth Of The Electrical Industry

CRESCENT INSULATED WIRE & CABLE CO.

TRENTON, NEW JERSEY



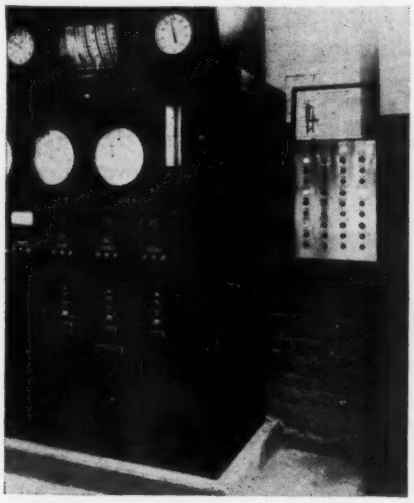
No coal dust can get into these controls for boiler room auxiliary motors. Board is located in an adjacent room.

Keeping Coal Dust Out of Switch Contacts

WIRING

Plant electricians frequently encounter trouble with motor controls and switches located in boiler rooms. Some of this can be traced to coal dust that gets into the switch enclosure and forms a deposit on the contacts.

This can't happen at the Chicago plant of the Liquid Carbonic Corporation. Robert B. Burton, supervisor of electrical maintenance and construction, solved the problem by keeping the switches out of the boiler room and adding remote control. All switches and circuit breakers for such auxiliary units as pumps and blowers are mounted in a control center installed outside the boiler room enclosure. All that remains in the boiler room is a handy pushbutton control panel with pilot light signals.

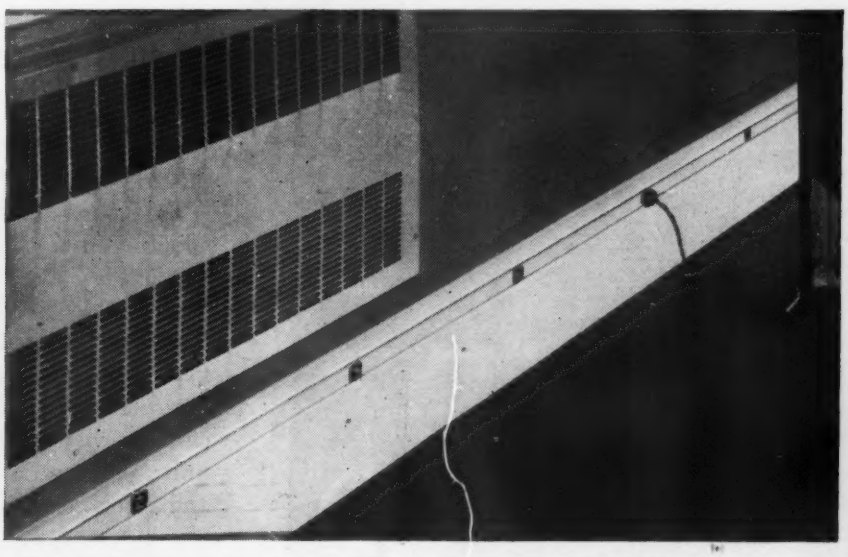


Remote control panel in boiler room for blower and pump motors.

Baseboard Channel Provides Office Service

DISTRIBUTION

The new 12-story annex to the Pacific Gas and Electric Company's home office building in San Francisco has installed nearly 2 miles of Plug-In Strip and Lopo Trim along the walls and partitions, providing unusual facilities for connecting desk lamps, dictating machines, fans, clocks, bookkeeping machines, check protectors and other electrified office equipment. This steel raceway provides electrical outlets every 18 inches and is mounted along the top of the baseboards on all floors of this new structure. The quarter-round LopoTrim on top of the steel raceway is also hollow so that, although its present use is solely decorative, it can be used in the future for a secondary channel for low potential buzzer, signal and telephone wiring. Both channels, manufactured by the National Electric Products Corporation of Pittsburgh, were installed with exterior and interior elbows and necessary fittings for a neat installation around corners and baseboard projections.



Electrical outlets placed on 18-inch centers around all walls and partitions in 12-story annex to Pacific Gas and Electric's San Francisco office building provides maximum convenience for connecting electrified equipment.

Flush Receptacle for Swivel Spot Lights

WIRING

When Langford Electric Company, Minneapolis electrical contracting firm recently installed a modern lighting system in a Minneapolis fabric and furniture store, considerable emphasis was placed on drama lighting, highlighting specific merchandising displays. Standard 150-watt PAR-38 spot lights in hooded, louvered, enclosures (Swivelier H-107) were chosen. These units have a standard Edison base plug that screws into a socket. (Fig. 1)

Outlets were installed throughout the ceiling, side walls and the tops of

No. 1626—Listed by Underwriters' Laboratories. Meets REA and Federal specifications.
No. 1620—Listed by Underwriters' Laboratories. Meets REA specifications.
No. 1612—Listed by Underwriters' Laboratories.
Side outlets not controlled by pull chain.
LISTED UNDER RE-EXAMINATION SERVICE UL OF UNDERWRITERS' LABORATORIES, INC.

Wiring costs come down when these go up!

Modern MONOWATT CEILING LAMPHOLDERS

In the time it takes to secure wires to binding screws, then screw the unit to outlet box, these ceiling lampholders by Monowatt are *installed.* There's no clumsy internal mechanism to fuss with . . . no porcelain ring to come loose or crack on you and pile up wiring costs. Modern Monowatt Ceiling Lampholders are molded of rugged plastic, and designed throughout to help you work more rapidly and efficiently.

Fits 3¼" and 4" Boxes . . . Breakage Losses Reduced

With wiring time such an important item today, the saving on installation costs alone makes it good business sense to use this new Monowatt Lampholder. But look at these other money-saving advantages: units fit both 3¼" and 4" boxes, cutting your inventory requirements in *half* . . . they weigh only half as much as porcelain, are more resistant to chipping and cracking, which reduces breakage and shipping costs.

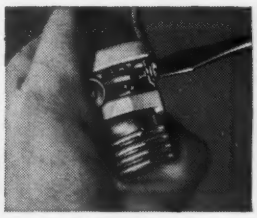
New *Keyless* Type Typifies Monowatt Pioneering

To its two basic types of lampholders—the 1612 (double outlet) and 1620 (pull chain)—Monowatt now adds a third: Cat. No. 1626. This one piece keyless unit with double terminal screws marks a real departure from conventional lampholder designs—and another step forward in Monowatt's march on tradition, applying common sense design in the development of more efficient wiring. Further proof that, with a few basic units, you can do a complete wiring job faster, better and at less cost with Monowatt.

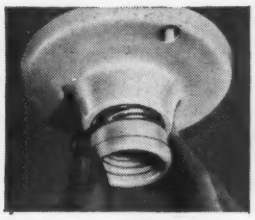
Better Wiring for Bigger Profits

OLD WAY— It takes time to do all this:

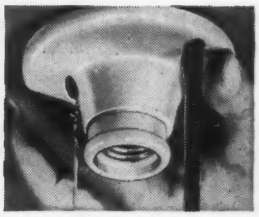
1. Disassemble — three parts



2. Wire internal mechanism

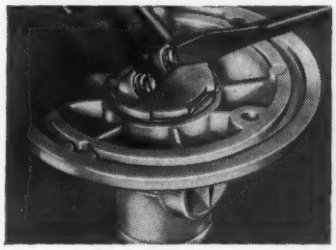


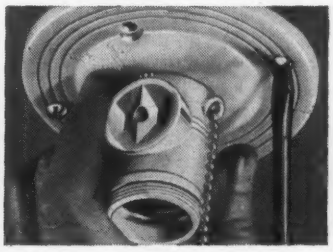
3. Reassemble



4. Screw lampholder to outlet box.

NEW WAY —Here's all you do to install Monowatt Ceiling Lampholders

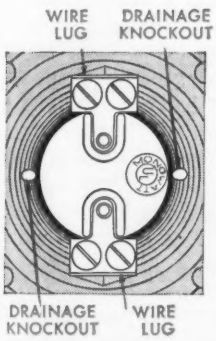




1. Secure code wire to convenient binding screws— no fixture wire required.

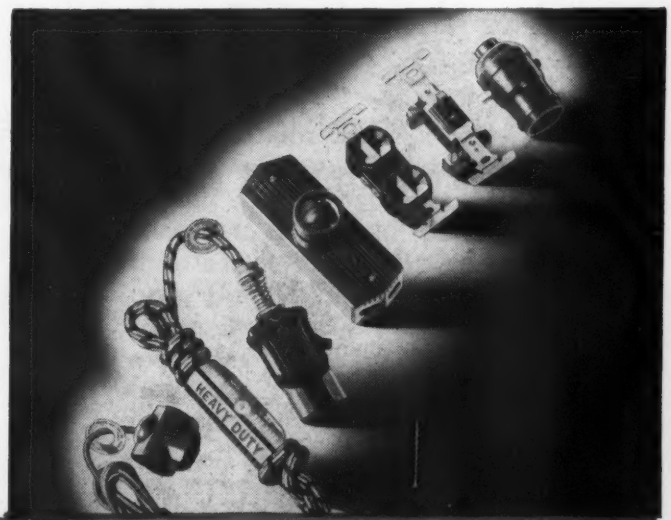
2. Screw unit to outlet box.

A quick, two-step job!



NEW... DOUBLE TERMINAL SCREWS FOR CONTINUOUS WIRING

The 1626 provides double splicing terminals for continuous wiring. Eliminates soldering and taping. Double Terminal screws have become standard on duplex convenience outlets. Now this same feature is yours in a ceiling lampholder.



Why not let a Graybar salesman show you these and other new product developments by Monowatt, designed to make electrical installations safer and cut your wiring costs. Ask to see the entire line of Monowatt wiring units—*there's money in it for you.*

Distributed by Graybar Electric Company

Graybar QUALITY SINCE 1869 • REG U.S. PAT. OFF.

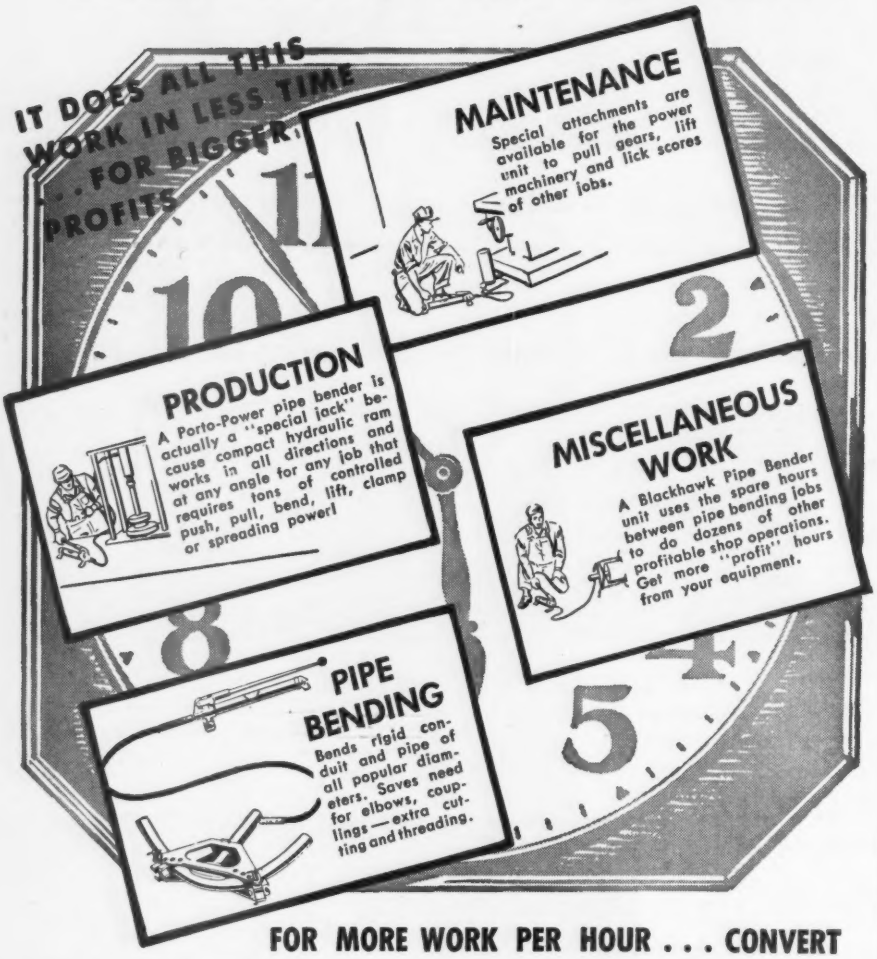
STOCKS IN MORE THAN 100 PRINCIPAL CITIES

MONOWATT INCORPORATED

A General Electric Affiliate

PROVIDENCE, R. I.

THE ONLY PIPE BENDER UNIT THAT ALSO "WORKS" WHEN THERE'S NO PIPE TO BEND


IT DOES ALL THIS WORK IN LESS TIME . . . FOR BIGGER PROFITS
MAINTENANCE
Special attachments are available for the power unit to pull gears, lift machinery and lick scores of other jobs.
PRODUCTION
A Porto-Power pipe bender is actually a "special jack" because compact hydraulic ram works in all directions and at any angle for any job that requires tons of controlled push, pull, bend, lift, clamp or spreading power!
MISCELLANEOUS WORK
A Blackhawk Pipe Bender unit uses the spare hours between pipe bending jobs to do dozens of other profitable shop operations. Get more "profit" hours from your equipment.
PIPE BENDING
Bends rigid conduit and pipe of all popular diameters. Saves need for elbows, couplings — extra cutting and threading.

FOR MORE WORK PER HOUR . . . CONVERT YOUR HAND-OPERATED PIPE BENDER TO POWER OPERATION

NEW P-182 Electrically-Driven Hydraulic Pump Brings You Speed, Power and Greater Economy

The amazing P-182 pump enables one man to easily bend any size pipe. Single control knob leaves hands free for measuring, etc. P-182 slashes pipe bending time — eliminates fatigue. It's a complete "profit package" containing pump, reservoir, valves and controls. Get full details on the new P-182 from your Blackhawk Industrial Supply Distributor.

A Product of **BLACKHAWK MFG. COMPANY, Dept. P2059, Milwaukee 1, Wisconsin**

BLACKHAWK

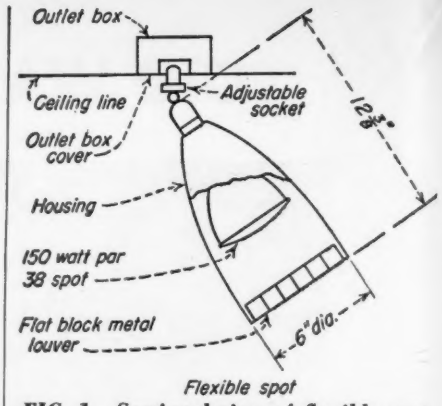


FIG. 1—Sectional view of flexible spot used for drama lighting. Unit screws into ceiling or wall socket.

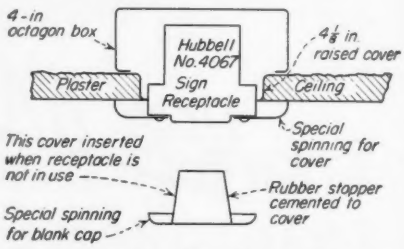

4-in octagon box
Hubbell No. 4067 Sign Receptacle
4⅛ in raised cover
Plaster
Ceiling
Special spinning for cover
This cover inserted when receptacle is not in use
Rubber stopper cemented to cover
Special spinning for blank cap

FIG. 2—Details of outlet showing use of sign receptacle with trim plate; also stopper cap to cover outlets when not in use.

columns. They were so spotted that drama lighting could be added at almost any location. The owners wanted to be able to move these spots from one place to another, as the displays changed, without leaving unsightly open sockets in view.

To meet these conditions, Langford Electric engineers designed a rather unique outlet and cap enclosure. The outlet consists of a standard 4-inch octagon box with a 4⅛-inch raised cover to bring the opening flush with the plaster ceiling. The outlet consisted of a Hubbell No. 4067 sign receptacle equipped with a special round, metal trim plate painted to match the ceiling (Fig. 2). The Swivilier spots were merely screwed into the outlets and adjusted to highlight specific displays.

Langford engineers also designed a similar blank cover plate to cap the outlets when not in use. These caps were also painted to match the ceiling and were equipped with a rubber stopper or "cork" cemented to the back of the cover. (Fig. 2). A mere twist of the wrist and a little pressure will insert the stopper cap in the receptacle socket. Removal is just as simple.

Reports indicate that the store management is well satisfied with the flexibility of this drama lighting scheme and more than pleased that their own personnel can quickly and safely shift the lighting arrangement to meet new display layouts as merchandising requirements dictate.

New!

GLAZON TRADE MARK

"TRIEX"

PREPARES FOR STRIPPING

5 times Faster!

HERE'S WHY:

The Present Way

You have to split the outer covering and trim it off. Then rip off the filler if it doesn't come away clean. Spread the wires apart and u-n-w-i-n-d the kraft paper wrap from one, *then* u-n-w-i-n-d the paper wrap from the other.

The New TRIEX Way

Just split the "Glazon" covering—tear it off—zip! The wires are ready to strip! That's all!

PLUS! EXTRA THICK INSULATION!

Not just the 2/64th rubber thickness found in ordinary cable . . . nor even a generous 3/64ths . . . but 4/64ths inch thickness of Type R rubber surrounds each conductor—even on sizes 14 and 12! You can see for yourself what this means in terms of extra protection . . . extra safety—and at no extra cost!

PLUS! EXCLUSIVE "GLAZON" COVERING!

TRIEX is the only non-metallic sheathed cable with this tougher, stronger, longer-lasting outer covering. Based on an inorganic substance derived from glass—which cannot burn, rot, or corrode; which is not affected by water, moisture, acid fumes, fungus or sunlight—"Glazon" achieves new highs in resistance to fire, moisture, oil, rodents and other elements that attack ordinary coverings. Clean and easy to handle—new finish uses no mica—it's slick!

Now you can prepare TRIEX Non-Metallic Sheathed Cable for stripping *five times as fast* — thanks to this new Triangle development!

Compare the *ordinary* way of preparing *present* types of non-metallic sheathed cable with the *faster* way, the *easier* way, the *simpler* way, of preparing Triangle's *new* TRIEX! See for yourself how *you* can save time and money at every switch box, outlet box, junction box . . . wherever connections are made!

Available in sizes 14/2, 14/3, 12/2 and 12/3 . . . solid or stranded . . . with or without ground wire. For 600 volt service.

If It's "Glazon" TRIEX It's Made by Triangle . . .
If It's Made by Triangle IT MUST BE RIGHT!

For samples and full information, contact your nearest Triangle distributor or representative, or write

ARTERIES FOR ELECTRICAL SYSTEMS — INCORPORATED

IT MUST BE RIGHT!

TRIANGLE CONDUIT & CABLE CO., INC.

1908 JERSEY AVENUE • NEW BRUNSWICK, N. J.

PLANTS: NEW BRUNSWICK, N. J. • MOUNDSVILLE, WEST VA.

BUILDING WIRE • BARE WIRE • ARMORED CABLE • "GLAZON" TRIEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE, SERVICE DROP, VARNISHED CAMBRIC BRAIDED OR LEADED, TRIOPRENE TRENCH, POWER AND PARKWAY CABLES RIGID CONDUIT • ELECTRIC METALLIC THIN WALL CONDUIT • FLEXIBLE STEEL CONDUIT

TESTS PROVE BRONCO 60 WIRE AND CABLES WITHSTAND

58,585

FLEX-LIFE CYCLES

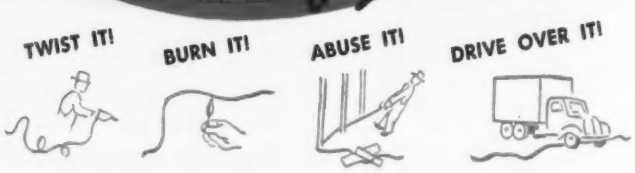
Here's proof positive that BRONCO 60 IS TOUGH

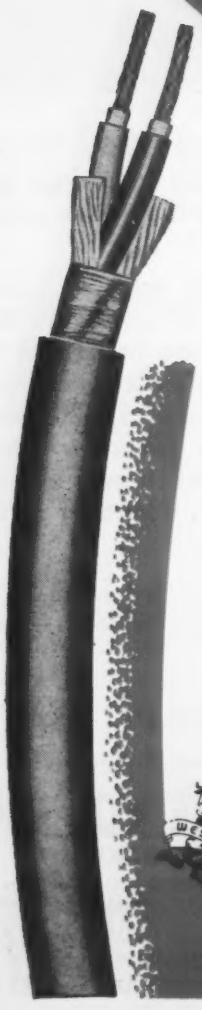
Four leading cords were put to test in Underwriter flexing machines . . . BRONCO 60 cord stood 58,585 flexing cycles, far greater than nearest competitive wire.

BRONCO 60

WIRE AND CABLE WITH THE DU PONT NEOPRENE JACKET

IS TOUGH AND Flexible





THE DEMAND IS INCREASING

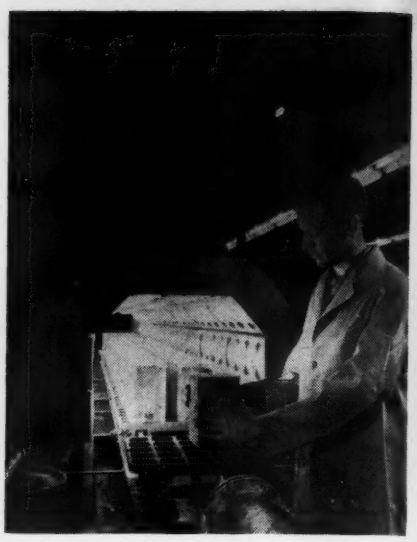
Day after day, month in and month out, more and more industrial plants and electrical contractors are asking for BRONCO 60, because they know its tough Neoprene jacket can stand the gaff on the toughest jobs and its extreme flexibility means long life, easy handling, lower maintenance cost, and safer operation.

BRONCO is a profitable line to handle because it sells faster . . . it is nationally advertised to dealers and users . . . it is made right . . . it is attractively packaged . . . and because no other wire offers so many advantages. It will pay you to sell the BRONCO line.

Write today for catalog on the complete BRONCO line.

WESTERN INSULATED WIRE CO.

1001 E. SIXTY-SECOND ST. • LOS ANGELES 1, CALIF.



Infrared oven melts 98% of the wax pattern of castings prior to placing molds in preheat furnace. Mold cracking has been reduced and defective castings minimized by this unit mounting 248 lamps.

Infrared Aids Precision Casting

INDUSTRIAL

A total of 248 infrared lamps of the 250-watt size are used to dry the molds used for making gas turbine blades and other intricate and hard-to-machine castings for customers of the Westinghouse Electric Corporation. In this manner, 98% of the wax pattern is melted out and the small residue is burned out in a preheat furnace where molds are heated to 1000-degrees C. for casting. This infrared oven replaced steam tables, low temperature ovens and the hot plates formerly employed, and the process has reduced mold cracking and the resultant percentage of defective castings formerly obtained.

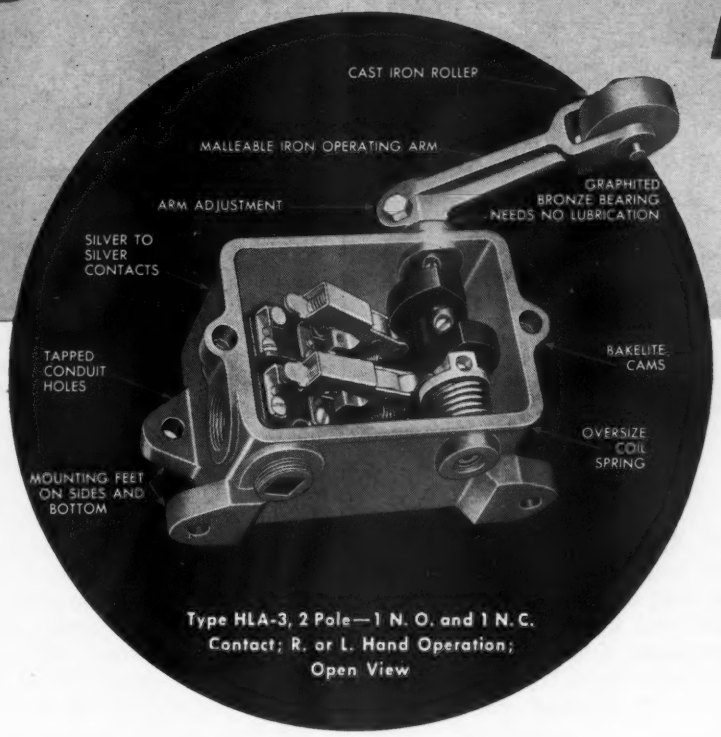
Grading Rivets Electronically

INDUSTRIAL

An electronic device has been the means of improving the methods of anodyzing rivets, so as to increase the output and to cut down on the manhours. Developed by Walter H. Bankard of the Glenn L. Martin Co. of Baltimore, Maryland, it is attached to a standard rivet sorter.

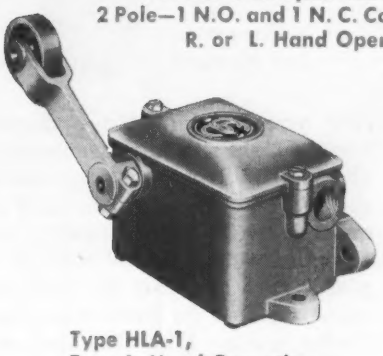
This development is a special electronic device of low voltage, with a magnetically operated lever which is energized by completing an electrical circuit between the plate and the contact point. As the rivets pass through the separator, the contact point touches the head of the rivet. If the rivet does

CLARK HATCHWAY LIMIT SWITCHES for HEAVY-DUTY APPLICATIONS



Type HLA-3, 2 Pole—1 N. O. and 1 N. C. Contact; R. or L. Hand Operation; Open View

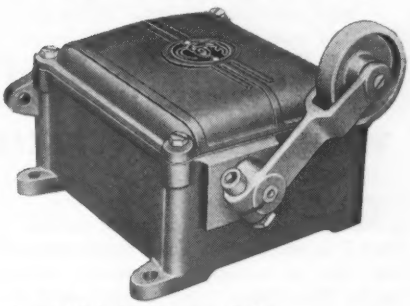
Type HLA-1, with Special Arm on 7" Phenolic Composition Roller; 2 Pole—1 N.O. and 1 N. C. Contact; R. or L. Hand Operation.



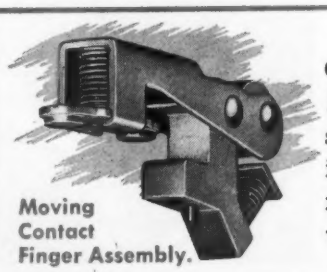
Type HLA-1, R. or L. Hand Operation; 2 Pole—1 N.O. and 1 N.C. Contact.

CLARK Bulletin 102 Hatchway Limit Switches are used as Pilot Circuit devices to limit travel or set up fuctions at predetermined positions. 1-, 2-, 3- and 4-pole types are available (see illustrations at right)—with a wide variety of contact arrangements. For convenience, mounting feet are provided on the side as well as on the bottom of the case. Flanges on the bottom prevent rocking and provide a solid base.

Weatherproof enclosures are standard on 1, 2 and 3-pole types. *Water-tight* is standard on 4-pole, and available for others. *Dust-tight* can be provided for all types.



Type HLA-44; Water Tight Enclosure, Right Hand Operation only; 4 Pole—any Contact arrangement.



Moving Contact Finger Assembly.

Contact Finger assembly is the same as in all CLARK Bulletin 102 Limit Switches, thus simplifying installation in plants having several types. Double-break alloy silver contacts require no dressing since oxidation will not cause poor contact. They may be removed by a simple twist with the fingers, and pressure spring will stay in position.

Clark Bulletin 102 Hatchway Limit Switches are available through your Clark Distributor.

EVERYTHING UNDER CONTROL

THE CLARK CONTROLLER CO.

1146 EAST 152nd STREET, CLEVELAND 10, OHIO

New-100% Oil and Grease-proof Deluxe Service Light

UL

No. 5025
Service Light
Convenience Outlet

Convenience Outlet Built into Moulded Bakelite Handle

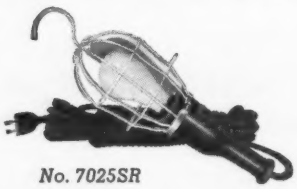
25' Vinyl Thermoplastic Cord and Plug

Now you can have an *Underwriters' Approved* portable Service Light with a convenience outlet built in the handle. The Bakelite handle is non-conductive, heat and impact resisting. The complete assembly is designed to resist oils, greases, acids, flame, moisture and abrasion. Each unit is equipped with 25' or 50'* of tough and pliable Vinyl Thermoplastic cord and plug for long life. The rugged steel wire cage is plated for extra wear and designed with exclusive No-Rol feature. The 5025 De-luxe Service Light is entirely new in portable lighting and gives exceptional service on many uses, especially in garages, maintenance departments and machine shops. Write for data today!

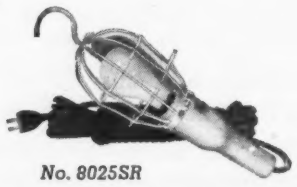
*50' cord is No. 5050.

TWO OTHER PORTABLE SERVICE LIGHTS WITH THERMOPLASTIC CORD AND PLUG

Based on 44 years of experience and popular demand two additional models of McGill Lamp Guards have been added to the line of complete assembly service lights. The Vinyl Thermoplastic cord and plug is tough and pliable and resists oils, greases and other hard usage. All models have strong, zinc plated steel No-Rol cages. They are finished with or without reflectors and LEVOLIER switches. No. 7025 is equipped with moulded rubber handle, No. 8025 with polished hard wood handle. Either may be supplied with 25' or 50' cord. (50' cord is No. 7050 and 8050.)



No. 7025SR



No. 8025SR

"AVAILABLE FROM YOUR ELECTRICAL WHOLESALER"

For Catalog No. 43 write to McGill Mfg. Co., Inc., 450 N. Campbell St., Valparaiso, Indiana.

McGILL
TRADE MARK
electrical specialties

ONLY McGILL MAKES Levolier SWITCHES

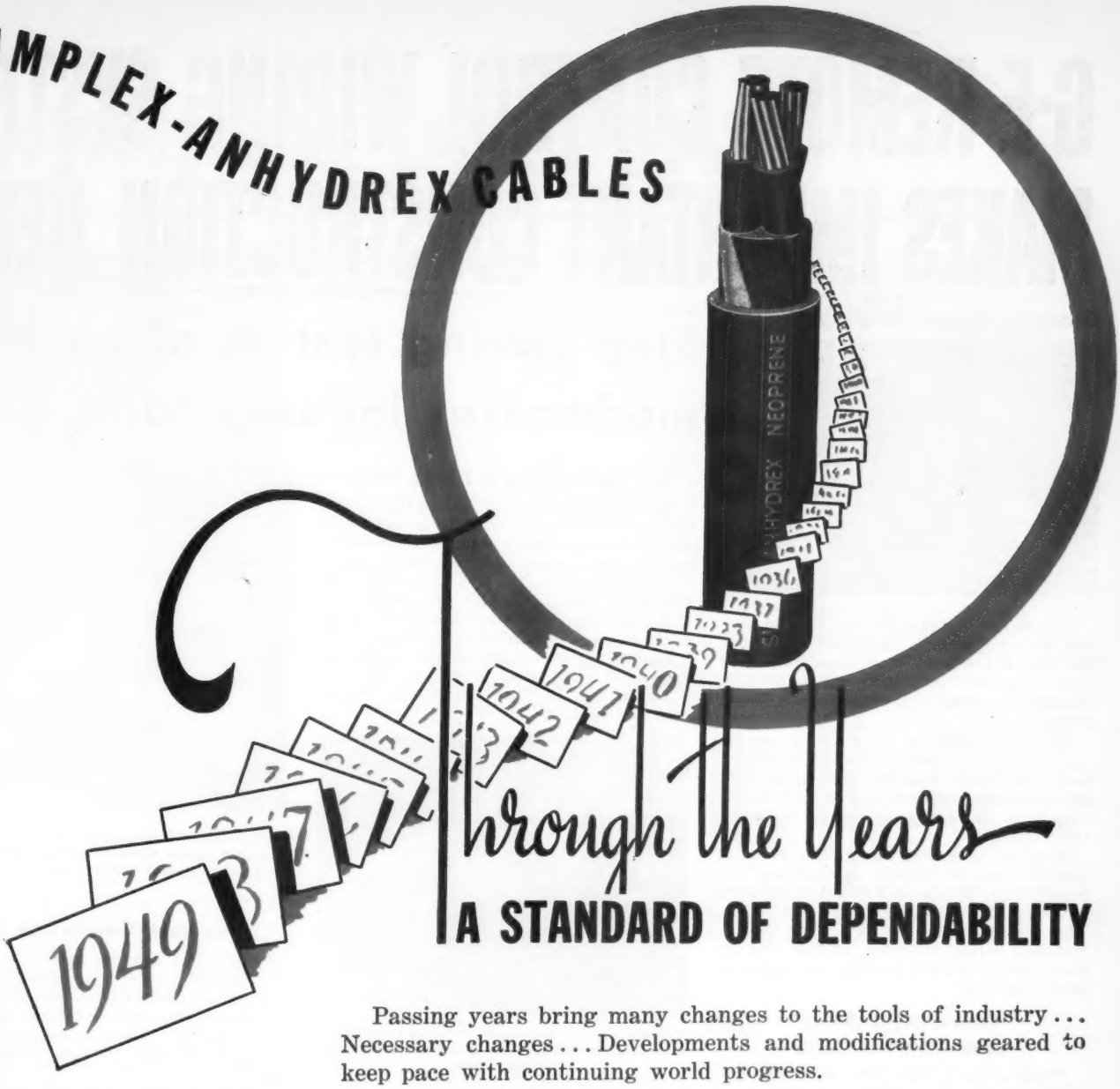
Electronic device, attached to rivet sorter, rejects rivets improperly anodyzed at Glenn L. Martin Co.

not come up to anodic specifications, a small relay is energized and the relay throws out the rivet.

This electronic control was designed to meet a specific need. An Industrial Engineering Effectiveness Report called attention to the need for improved methods in anodyzing rivets. The Methods Group picked up this item from the report and made it the subject of study. Walter Bankard was then assigned the task of developing something by which it would be possible to separate rivets anodyzed according to specifications, without having them sorted by hand, as had hitherto been necessary. His device was developed and has proved highly efficient for the purpose for which it was intended. It is widely applicable in its use, being of value wherever anodyzed rivets are used.

Roof-suspended air cooled transformers serve lighting feeders at ALCOA's new Davenport plant; are out of the way, yet easily accessible from crane bridge. Angle-iron support welded to roof purlin suspends unit just above bottom chord of truss. Bolted connection at transformer facilitates quick replacement. Some 800 units were installed in this manner by Fischbach and Moore, Inc., electrical contractors on the project.

SIMPLEX-ANHYDREX CABLES



Through the Years—
A STANDARD OF DEPENDABILITY

Passing years bring many changes to the tools of industry... Necessary changes... Developments and modifications geared to keep pace with continuing world progress.

Simplex-ANHYDREX Cables have undergone just such changes.

Introduced to the electrical industry years ago as the first rubber-jacketed cables for burial directly in earth, they have ever since maintained leadership among underground cables.

But improvements in design have extended that leadership! Today, ANHYDREX Cables are unexcelled as 3-way cables, providing low-cost, trouble-free service when buried in earth, installed in ducts, or used in aerial runs.

First in the past, first now, ANHYDREX Cables — backed by progressive Simplex research — promise to continue as the standard for comparison in the future. It will pay you to include them in your plans for tomorrow's power, communication, and signal circuits.

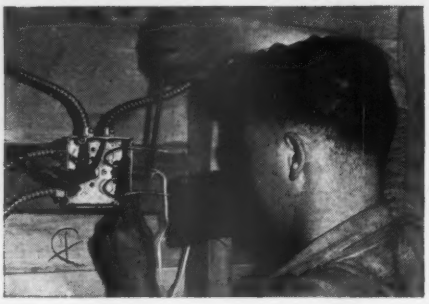
SIMPLEX-ANHYDREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

G-E REMOTE CONTROL WIRING SYSTEM MAKES IMPORTANT CONSTRUCTION NEWS

Step-saving system of switches modernizes industry, farm, home

Compact Relays Simplify Wiring



Key to the General Electric remote control wiring system is the small relay that fits into a knockout in a standard outlet box. A twenty-five-volt circuit is used to energize the relay from a step-down transformer.

With the relay in place, leads can be run from it to many convenient switch locations. Small, neat-looking remote control switches can be placed practically anywhere, and can be easily connected to these leads.

Principal components of the General Electric remote control system are the transformer, lightweight Number 18 wire, remote control switches, and the relay. These units are all designed to fit in with standard wiring practices. In fact, the remote control system requires no change in power circuits.

Contractor, Architect Have Unlimited Scope

Working as a team, the electrical contractor and the architect can devise unlimited applications of the General Electric remote control wiring system.

Limited budgets as well as high-priced jobs, can well afford this practical, new system. Even for low-cost dwellings, the architect and contractor can use a few remote-control circuits which add another selling feature.

It will pay you to talk to your General Electric Construction Materials distributor about this new system right away.

Cuts Wasted Time in Plants, Farms

Industrial plants, commercial buildings, hospitals, and farms can do a man-sized job of cutting wasted time with the General Electric remote control wiring system.

The farmer can use this system to control lights and light-duty motors in outbuildings, right from the farmhouse or the barn. In industrial plants and commercial buildings, entire floors of lights can be controlled both from switches near the light fixtures and at convenient master control points.

Valuable working time can be saved by conveniently-located switches in the General Electric remote control wiring system.

In hospitals, General Electric remote control switches can be placed at each bed and at room entrances. Master control can be located in an office or hallway.

Because of the simplicity of this system (see story, Column 1)—because remote control switches and wire are small and trim the General Electric remote control wiring system makes neat surface-wiring installations in existing buildings. Surface installations of this kind can easily be relocated as the requirements change.

A single General Electric remote control switch, or a bank of remote control switches, can be located anywhere to give convenient control of appliances and lights.

Offers Home Owners New Benefits

Dream-home lighting control—a practical, economical system that permits any number of switches to be placed practically anywhere in a home, for the ultimate in convenience! That's the promise of the General Electric remote control wiring system.

Now, switches for garage lights can be placed anywhere in a home—in the garage, in the front entrance hall, on the upstairs landing, and even in the master bedroom —at a price the homeowner can afford to pay. In fact, remote control switches in the master bedroom and any other location can eliminate the homeowner's nightly inspection tour, simply by giving him full control of all lights from one or more convenient spots.

Yard lights, cellar lights, attic fan, and any number of lights and small appliances can now be controlled from many locations —can even be wired to give full control from a favorite easy chair.

Permits "Pathway Lighting"

Another valuable convenience, now made economical and easy to install, is planned "pathway lighting."

Under the pathway lighting plan, the remote control system follows the traffic pattern of a home, with switches in all hallways and entranceways. Wiring for this plan can be arranged so that the householder can walk into a darkened house, turning on lights ahead of him, turning out the lights in rooms he has just passed through—without retracing his steps. Outdoor lights can be wired to give pathway lighting to house and grounds.

Learn about this new advance in wiring now!

Mail Coupon

Section D39-518
Construction Materials Department
General Electric Company
Bridgeport 2, Connecticut

Please send me your new bulletin about the General Electric remote control wiring system.

Name_____ Title_____

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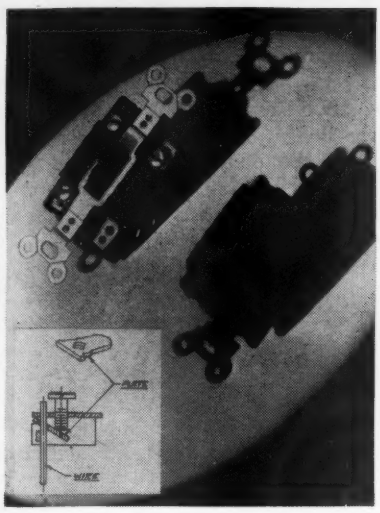
GENERAL ELECTRIC

Equipment News



Switches

New flush tumbler switches have been announced. Available in 10 and 20 ampere ratings for all standard connections, they are offered in single and double pole, and three way, four way and single pole quadruple break models. Designed for back or top wiring, switches feature totally-enclosed mechanism, double switch blades of the positive, self-aligning type, protected by arc-snuffing barriers. Units are built into a shallow, 1½ inch base. Washer-type plaster ears are standard on all models. Terminal screws are loosened; the stripped end of wire is inserted, from the back, into terminal holes and the screw tightened to grip the wire. Top wiring with the conventional binding screws is also possible. Arrow-Hart & Hegeman Electric Co., Hartford 6, Conn.

Jet Pump Motors

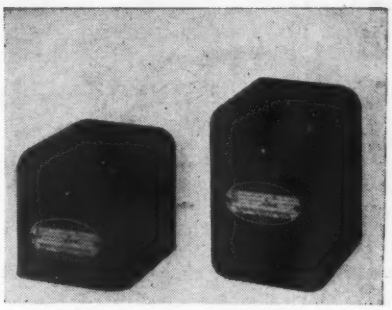
B-Line jet pump motors are now available in ratings from ½ through 1 hp., 40°C rise, for continuous duty. They are the flat face type suitable for either vertical or horizontal mounting. Mounting dimensions are identical for all ratings. Standard shaft extension or threaded shaft for direct connection to pump impeller, can be furnished. Motors are equipped with ball bearings which are lubricated and sealed at factory. Available in single phase capacitor start induction run type, 115 or 115/230 volts. Single phase motors have automatic thermal overload protector. Two or three phase squirrel cage induction types, 220 or 220/440 volts, can be furnished. Compound wound d-c motors 115 or 230 volts are available. The Brown-Brockmeyer Company, Dayton, Ohio.

Electric Saw

Three sizes of portable electric circular saws, called "Hi-Speed Saws", have been announced. No. 944 has 2-7/16 inch capacity, 7½ inch blade, 4500 rpm., No. 964 has 2-13.16 inch capacity, 8¼ inch blade, 4500 rpm.; and No. 974 has 3¼ inch capacity, 9½ inch blade, 3600 rpm. Blades are also available for cutting through nails, copper, brass, bronze, lead, tile, glass, brick, clay products, concrete, marble, flagstone, asbestos, cement products and Celotex. All units are furnished with metal carrying case, rip fence, 15 ft. of cord. 110 volt motor operates on a-c or d-c. Chicago Pneumatic Tool Company, 6 East 44th Street, New York 17, N. Y.

Tube Disposal Unit

A new fluorescent tube disposal unit, No. 4860, has been announced. Unit will save costly time-off for injured workers. To operate, turn on the motor and water, and place the burned out tubes in the open end. The tube is broken and crushed and the beryllium is washed down the drain. Unit will take up to 30 tubes per minute ranging from 15 to 60 watt sizes. It has a standard ¼ hp. motor and operates on 110 volt, a-c. Special voltages also available. Telbev Manufacturing Co., 111 E. Wisconsin Ave., Milwaukee 2, Wis.



Ignition Transformers

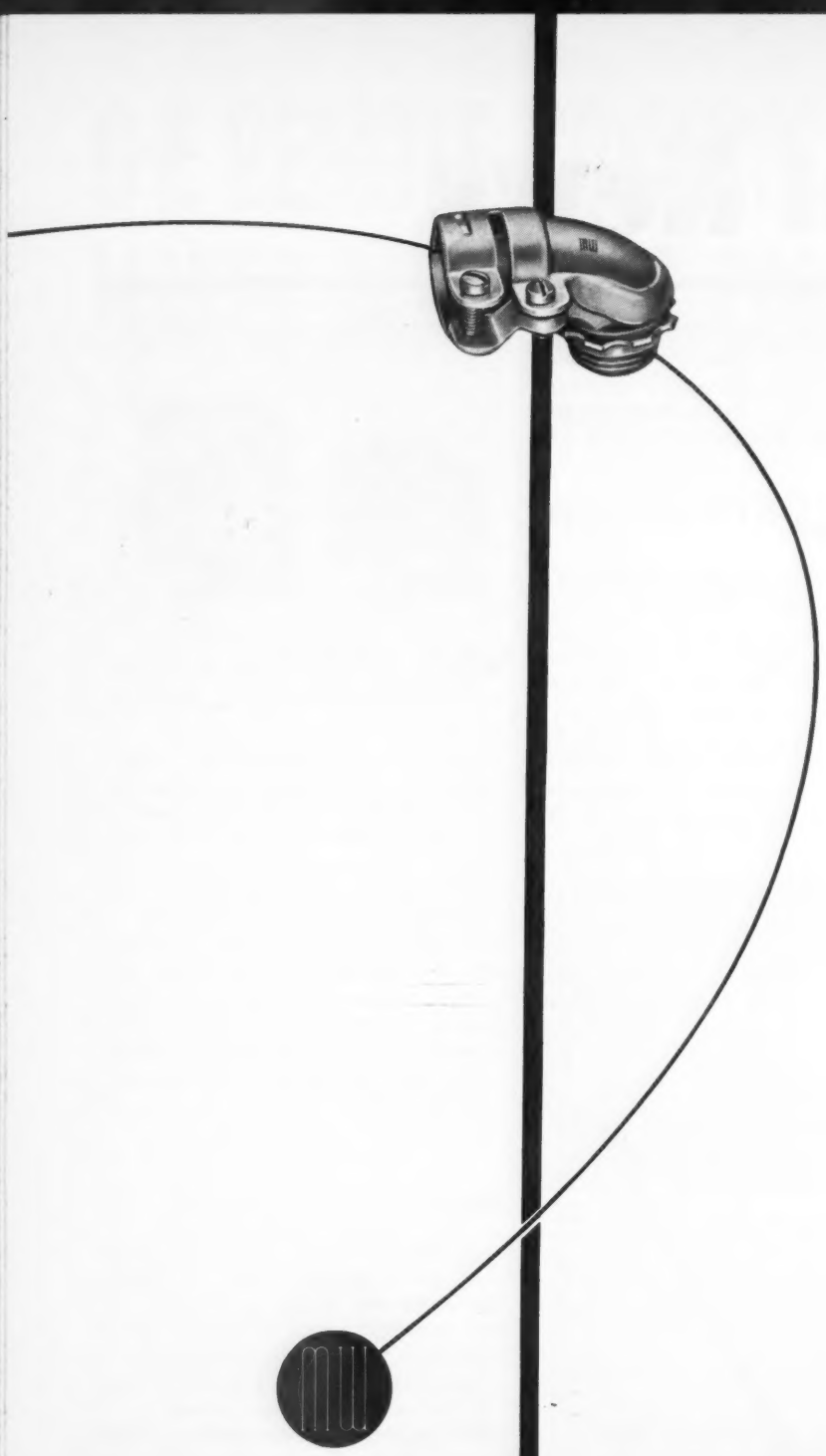
A new line of four standardized ignition transformers for domestic oil burners has been announced. Available in two case sizes, medium and small, they are complete with built-in two-way self-shielding for radio interference suppression. A model for single-slot end mounting and one for concealed mounting are available in each case size. High voltage bushings and low voltage junction boxes are located at the same end of the transformer. A steel junction box partition provides protection of the low voltage coils. General Electric Co., Schenectady 5, N. Y.

Hoist

A portable hoist, known as "Lug-All", has been announced. It weighs 8½ pounds and is capable of lifting one and one half tons. Crafted of alloy aluminum, hoist may be used by a single worker. Handle may be reversed so that user may take advantage of easier operating conditions in tight places. Hoist can be repaired on the job with a wrench or screw driver. Lincoln Precision Machining Company, North Grafton, Mass.

Troffer

This new glass surface troffer features an easy-to-use hinged enclosing glass. There are no screws, springs or latches to lose or get out of order. Units have side of channel starters that are easily reached and changed. Glass is a curved panel of ribbed Albalite. Troffer is finished in 300° white permalux with ornamental silvan end ornaments. Edwin F. Guth Company, 2615 Washington Ave., St. Louis 3, Mo.



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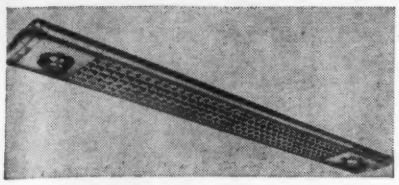


Fluorescent Fixture

The "New Horizon" slimline fluorescent lighting fixture and "Directlite" spotlights have been combined and named the "Spotline". This combination serves to give abundant overall light with spotlight emphasis where dramatic display effect is desired. The spotlights in the Spotline are adjustable for any lighting angle desired. Leader Electric Company, 3500 N. Kedzie Ave., Chicago 18, Ill.

Battery Charger

A new Rectox copper oxide battery charger, particularly suited for "on-the-spot" charging of industrial truck batteries in warehouses, freight terminals, piers, docks and industrial plants has been announced. It features the saturable reactor control. It can be obtained as a combination unit to charge either lead-acid or nickel-alkaline batteries. With the addition of a "plug-in" charge control panel, the change from a nickel-alkaline charger to a lead-acid charger can be made quickly in the field. Charger is designed for either 230 to 460 volts. Westinghouse Electric Corp., Pittsburgh 30, Pa.

Heaters

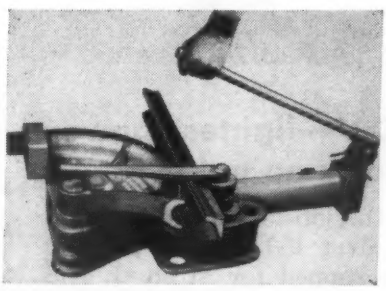
A new series, No. H 210 J, of wall attachable and wall insert forced air heaters has been added to this line. There are eight models in the series. Two heating elements of coiled chrome resistance wire team with a ten-inch, four-bladed fan to deliver, in one model, 20,472 Btu's. The fan is driven by an induction type motor which operates on 50-60 cycle a-c. Thermostatic control is optional. Models H 210 JT and H 210 JTW are equipped with built-in thermostats. The thermostatically controlled models operate automatically to hold a 2 degree tolerance at temperatures ranging between 55 and 85 degrees. They operate on 240 volts and are available in various models using 3000, 4000, 5000, and 6000 watts. Markel Electric Products, Inc., and La Salle Lighting Products, Inc., Buffalo, N. Y.

Pnuematic Timers

A new d-c pneumatic timer (Class 9050) has been announced. Outstanding features are: accurate timing; wide range; easy timing adjustment; snap action contacts; and electrical interlocks. Usual applications are found in timing motor acceleration, machine sequences, process industry operations, resistance welds, and many similar functions. Both d-c type Q and a-c type R timers are available, arranged for time delay after either energization or de-energization of the magnet. Square D Company, 4041 North Richards St., Milwaukee 12, Wis.

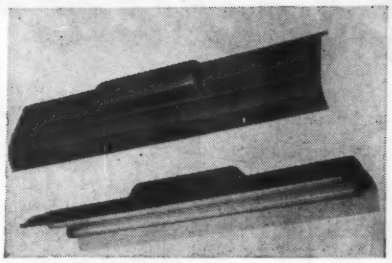
Regulator

A 500 VA instantaneous electronic voltage regulator has been announced. Designated as Stabiline Type IE51005, the input voltage range is given as 95-135 volts. The output voltage range is adjustable between 110 and 120 volts. Rated output of model is stated as O-500VA, frequency in cycles is 60, plus or minus 10%. Load power factor range is given as 0.5 lagging to 0.9 loading and waveform distortion is claimed never to exceed 3%. Stabilization is stated as plus or minus 0.1 of 1% of preset value; regulation is plus or minus of 1% of preset value. Recovery time is stated as 3 to 6 cycles. The Superior Electric Co., 20 Hannon Ave., Bristol, Conn.



Bender

A new portable thin wall tubing bender has been introduced. It is primarily designed for EMT tubing, but is practical for hard copper tubing, stainless steel tubing and thin wall tubing of other commercial metals. Unit has two parts that fasten together with a "U" key. Changeovers from one size of tubing to another, can be accomplished with aluminum formers. Machine will handle all standard sizes of tubing from 1 to 2 inch diameters. A special 2 inch former is also available for making of parallel bends. Tal Bender, Inc., Milwaukee, Wis.



Industrial Fixture

A new two-lamp industrial type fluorescent lighting fixture has been introduced. Known as Economy Model EF-240, fixture is packed two units per package. Each unit includes two 40-watt lamps plus Glostart starters. Exclusive features are: one-piece chassis; 20-gauge steel construction; die-punched deep-drawn chassis which provides positive lampholder spacing; synthetic all plastic enamel; Sylvania starters, lampholders and lamps. Reflector is one-piece, and has a wing nut fastening to the top housing. High power factor ballast is totally enclosed in the chassis. It carries UL approval. Sylvania Electric Products Inc., 500 Fifth Avenue, New York, N. Y.

Automatic Oilers

New "Vari-Feed" automatic oilers have been introduced. They have a new principle of visible, automatic lubrication for solid wick and waste-packed bearings. Rate of feed is adjustable to the exact amount desired by inserting heavier wicks into the retainer to reduce the flow, or lighter wicks when faster feed is desired. Wicks are colored for quick and easy selection. Adjustable to feed filtered oil or liquids as thin as water or as heavy as molasses. Trico Fuse Mfg. Co., 2948 N. 5th St., Milwaukee 12, Wis.

Service Body

Model No. 60 KD all steel service body for carrying tools and material to and from the job has been announced. It is designed for mounting on any late model ½ ton chassis, less the standard rear fenders. Service body is designed for shipping partially knocked-down to customer for final assembly and mounting on chassis at destination. This saves on shipping costs due to smaller sized shipping container required. Artisan Products, Inc., Cleveland, Ohio.

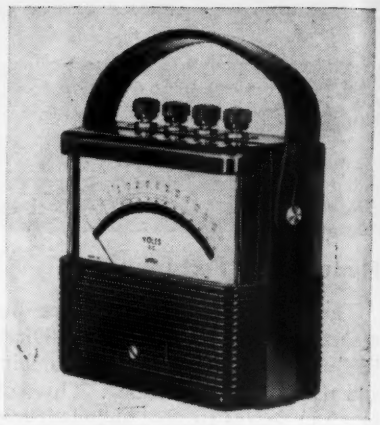
Work-Saver POWER FOR HAND PIPE TOOLS

One man carries it!

RIDGID Model "400"—lightest power unit made—practically no upkeep

● You *can* take it with you, for the job-tested Model "400" power drive weighs just a little over 100 pounds. Modern lightweight alloy case can't be topped for strength and durability. Universal motor—forward, reverse; light socket power, turns pipe for your hand threaders, cutters, reamers—saves time, effort. RIDGID lathe-type 3-jaw chuck in front with chuck wrench ejector; self-centering workholder in rear turns with pipe. Sealed-in lubrication . . . no oil to spill. See the RIDGID "400" at your Supply House.

RIDGID
WORK-SAVER PIPE TOOLS
THE RIDGE TOOL CO. • ELYRIA, OHIO



Instruments

A new series of a-c and d-c portable instruments has been announced. Designated Model 901 series, they have non-breakable windows that extend the full width of the instrument, curving around each side to reduce shadows. Units are equipped with hand-calibrated mirror scales and knife-edge pointers. Both a-c and d-c units are shielded against external magnetic fields. Model 901 instruments are available as d-c voltmeters, volt-ammeters, ammeters, milliammeters and microammeters; Model 904 is available as a-c voltmeters, ammeters and milliammeters. A series of a-c rectifier type instruments is supplied as voltmeters and milliammeters. Weston Electrical Instrument Corp., 617 Frelinghuysen Ave., Newark 5, N. J.

Bender

A new portable bus bar bender has been introduced. Developed for public utilities and other large power plants, its flexibility makes it adaptable to use in the shop and in the field. Measuring 18½ inches overall, it can be stored in the maintenance truck. Weight is 110 pounds. It has ample capacity to bend bus bar up to 4 inches wide and ¼ inch thick to a 90° angle. Flexo Machines Co., 456 N. Aberdeen St., Chicago 22, Ill.

Electric Heater

Announcement has been made of an all-electric explosion-proof heater. It is specially designed for use in atmospheres containing gasoline, petroleum, naphtha, acetone, benzol, lacquer, solvent vapors and natural gas, all locations specified by UL in Class 1, Group D. Unit incorporates a patented cast aluminum, natural convection, safety-grid. Heating element is a nickel chromium resistor wire, insulated and sheathed in a seamless metal tubing,

for **reliable starting**
low operating costs
full fluorescent lamp life

USE CERTIFIED STARTERS

● Satisfactory fluorescent lighting performance depends to a large degree on the starters you use.

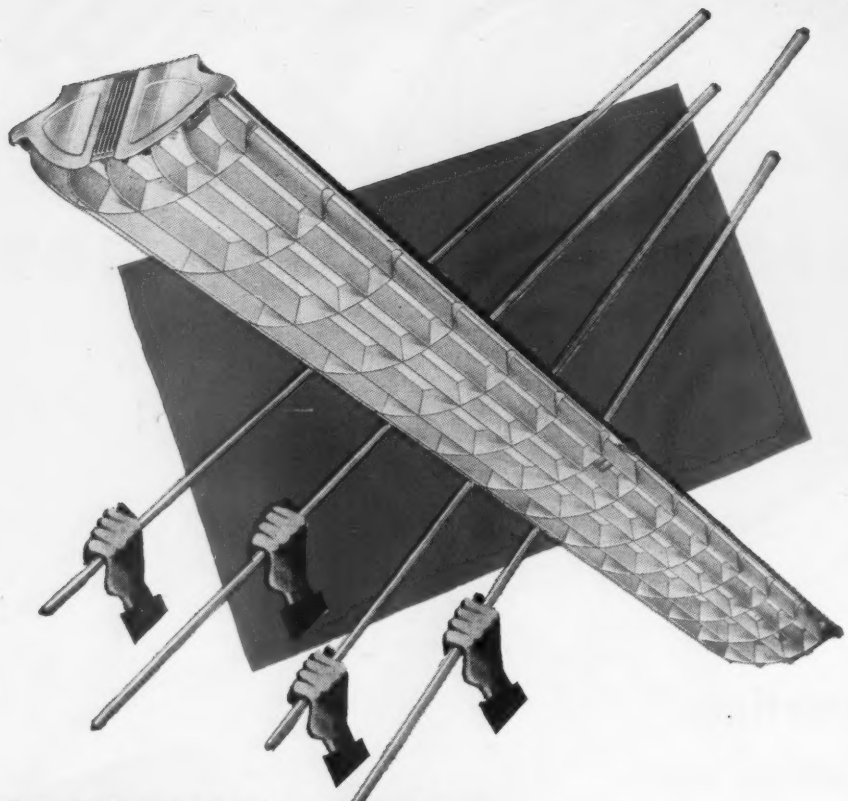
You are assured best results . . . in starter life . . . in lamp life . . . and in maintenance costs . . . when you use Certified Starters.

Certified Starters are made to precise specifications, then are tested and certified by Electrical Testing Laboratories, Inc., an impartial authority. That's why you can always rely on Certified Starters.

● *You'll recognize Certified Starters by the Certified shield on the case and on each starter.*

Certified Fluorescent Starter Manufacturers

2116 KEITH BUILDING • CLEVELAND 15, OHIO



SLIMLINE LAMPS
and
GUTH SLIMLINE TRUCOLITE*

the winning team

The only **Slimline** fixture with downlight reflectors for maximum benefit from the new lamps. Greatest light-producer—sleek appearance. Easy to handle. One man can install it. Simplified wiring. Immediate delivery.

Versatile! For 2 or 4 lamps—open, with eggcrate louvres, or glass diffusers—mounted flush or suspended, in units or rows. For 200, 300 and 425 m.a. lamp intensities.

Cash in on the profit-packed **Slimline** advertising—send for Bulletin 852-A from

Guth LIGHTING

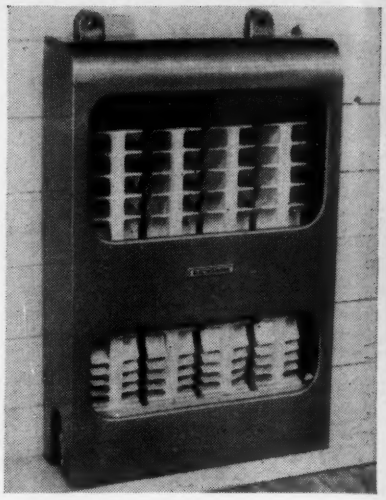
YOUR TEAMMATE IN *precision-planned* LIGHTING

THE EDWIN F. GUTH COMPANY / ST. LOUIS 3, MISSOURI

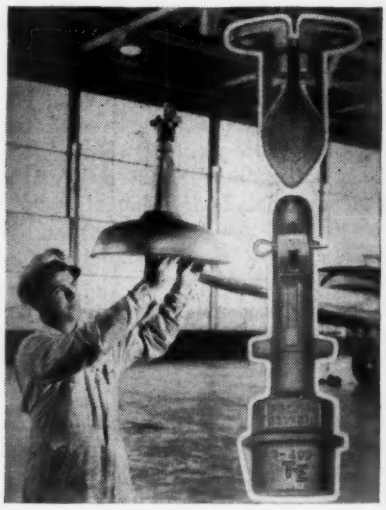
*Ⓡ—U. S. Patent Nos. 122586, 2331774

821

Leaders in Lighting since 1902



which is embedded in a one-piece finned aluminum casting. This seals the element, eliminating fire, shock and burn hazards. It provides complete or auxiliary heat for hazardous locations. Unit may be thermostatically controlled through a contactor. Heater is mounted to a wall and service is run to a connecting box on the outside of the heater. They are available in three models with ratings of 2000, 4000 and 6000 watts. The 2 and 4 watt sizes for operation on 240 and 480 volts, single phase. The 6 watt for use on 240 or 480 volts, single or three phase. Electromode Corporation, 45 Crouch St., Rochester 3, N. Y.



Fixture Hangers

Announcement has been made of the modification of this complete line of disconnecting and lowering hangers to incorporate a heat-treated aluminum alloy casting for the positioning stem and a re-designed, stronger guide tube. The alloy stem, provides greater strength at less weight and is more resistant to corrosive atmospheres and weather. Positioning stem features a multiple rib design which allows ac-

Steel City's Complete Line

of High Quality Boxes, Covers and Fittings Designed for Maximum Ease of Installation

MEETS EVERY NEED

The Line Includes

(In All Required Types and Sizes)

OUTLET BOXES AND COVERS

SWITCH BOXES

LOCKNUTS AND BUSHINGS

CONNECTORS

INSULATOR SUPPORTS

FLOOR BOXES AND ACCESSORIES

CONDUIT BENDERS

CAST IRON JUNCTION BOXES

SERVICE ENTRANCE FITTINGS

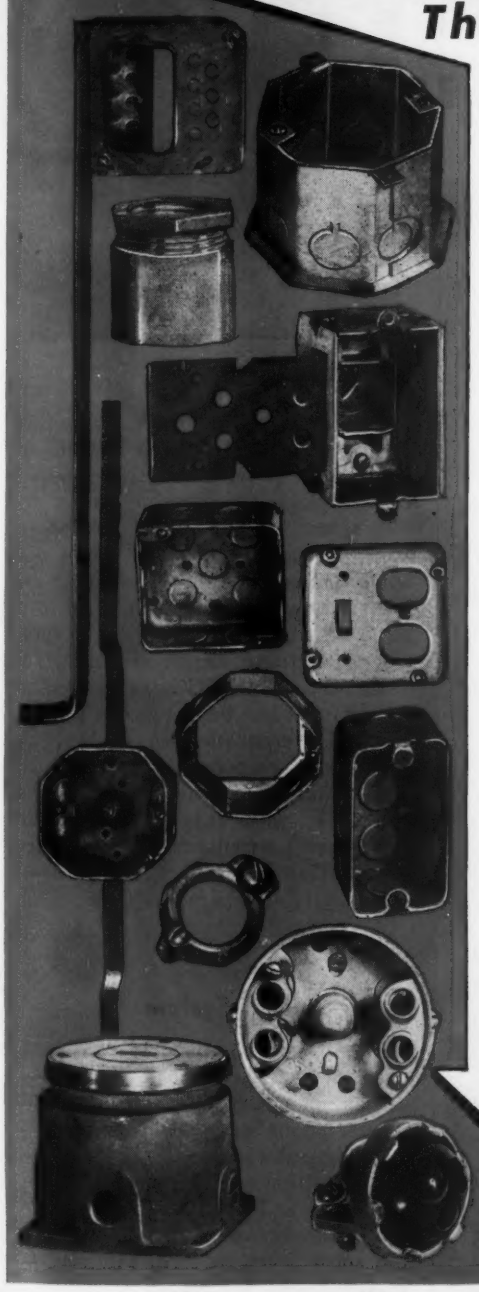
STRAPS AND STAPLES

GROUNDING FITTINGS

THREE-PIECE CONDUIT COUPLINGS

MARCHAND CLAMPS AND PLUGS

CAMPBELL BOXES AND ACCESSORIES



Steel City Leads in Meeting Your Needs

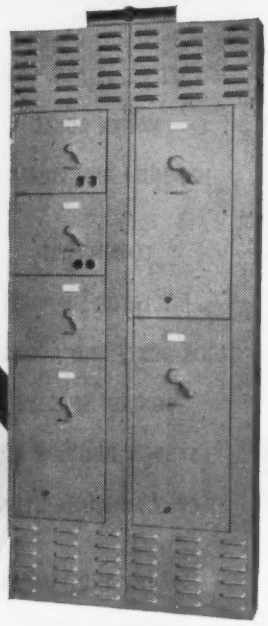
STEEL CITY ELECTRIC COMPANY

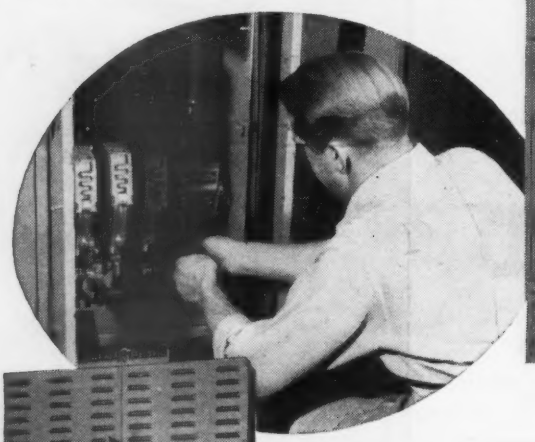
1207 COLUMBUS AVENUE, PITTSBURGH 12) PENNA

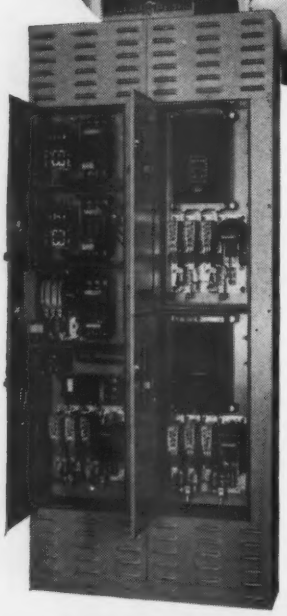
ECONOMIZE as you MODERNIZE

... GE Motor Control Centers

CONTROLLING motors on a process? Economize with standardized, pre-engineered and factory assembled G-E motor control centers. Vertical sections are only 12 inches deep. Standard starter units (NEMA Size 1, 2, 3, and 4 for 1 to 100 hp motors, 440 volts and below) are completely metal enclosed, have short-circuit and overload protection.



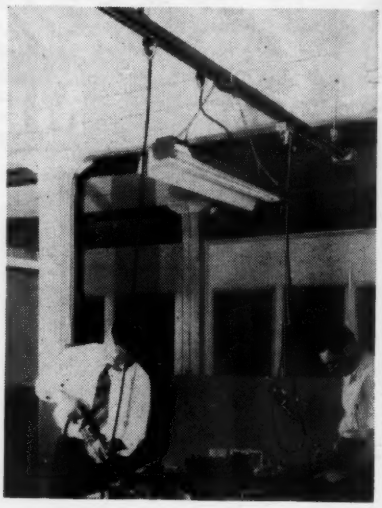




Save on wiring costs. Connections to incoming power from vertical bus bars are made in one quick shove by means of "clothespin contact", a special device on the back of each starter unit. Four screws hold unit in place. Wiring troughs are five inches wide, easily reached when cover plates are removed. Terminals are at top or bottom as you prefer. Everything front connected for flexibility of arrangement. Write for more details on these low-cost G-E motor control centers—Bulletin GEA-4979—at the nearest G-E office. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

curate forming of the diameter to within 0.001 inch; decreases the metal to metal contact; and reduces the clearance required between the stem and guide. They carry UL approval. The Thompson Electric Co., 1101-57 Power Avenue, Cleveland 14, Ohio.



Trolley Busway

New LTG Flex-A-Power plug-in or trolley busway has been announced. Designed to provide both trolley power take-off and a continuous outlet for fluorescent lights and small power tools, the busway is of 2, 3 or 4 pole construction with one compact housing. New simplified hanging and joining methods have been used to speed up installation. Rated 50 amps., 250 volt, a-c or d-c, LTG has two or more circuits that can be run in one housing and still be controlled separately. Plugs or trolleys are polarized so that loads may be balanced conveniently on both sides of busway. It is built in standard fittings such as elbows and radius sections. The Trumbull Electric Manufacturing Co., Plainville, Conn.

Multi-Station System

The basic two-phone system design has now been extended to include a master phone system consisting of one master phone station and up to eleven outlying substations. By means of a multi-position radial selector switch, it can select and signal any one or all of the substations on the system. Any of the substations, in turn, can ring the masterphone. Up to six stations can be operated on a common talking or "conference" basis. There is also a multi-selective ringing and talking system. This system consists of up to twelve master phone stations and enables user to selectively ring any one

[Continued on page 165]

Colorful Colonial

by Virden

FOR DINETTE OR HALLWAY

No. 2871
Colonial brass, pastel green shade, Provincial blister glass

No. 3031
Polished copper and rusty iron.

No. 2851
Colonial brass and canary yellow shade.

No. 851
Colonial brass with hand-cut shade

No. 2831
Colonial brass with red shade, Hob-nail glass.

VIRDEN VALUE

These charming colonial fixtures by Virden add a bright touch of cheer in new homes or old.

Customers welcome not only their pleasing decorative quality but their moderate prices—Virden values that grow out of tasteful designs planned for Virden mass production skill.

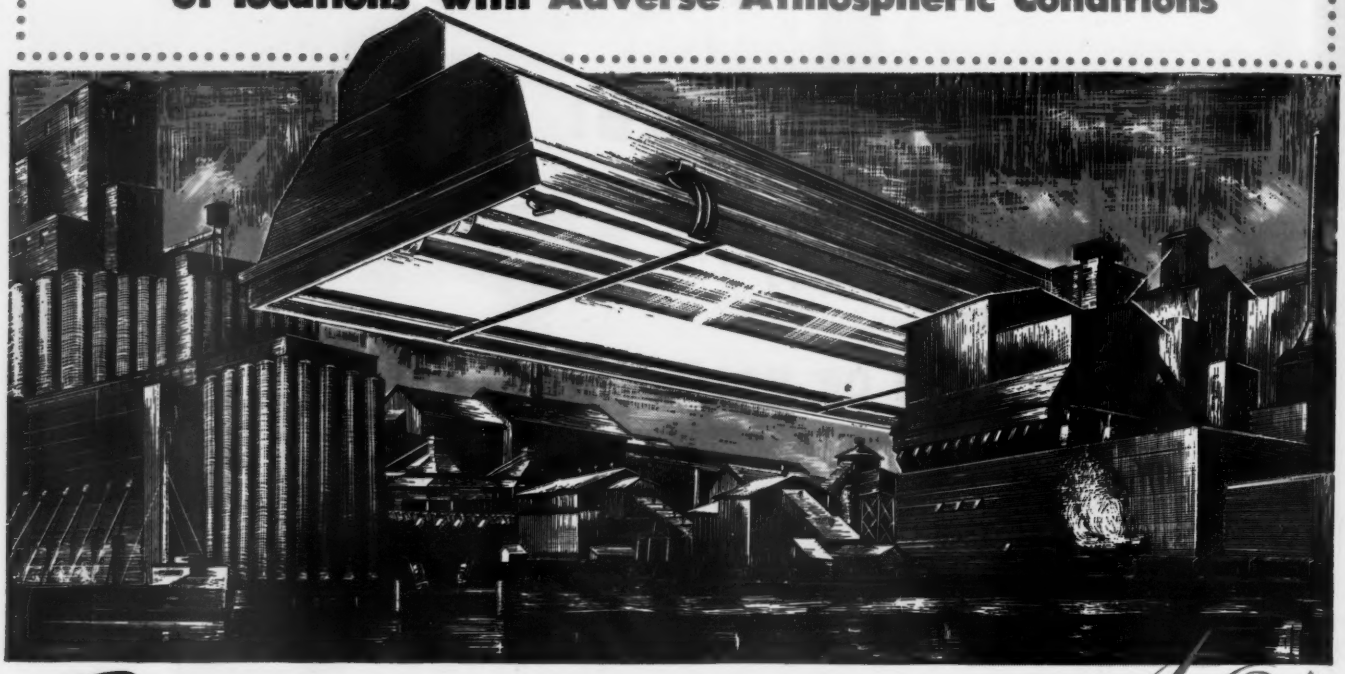
As always, you'll get quick action from your Virden jobber.

John C. Virden Company • Cleveland, Ohio

Member American Home Lighting Institute

FOR *Modern* LIGHTING

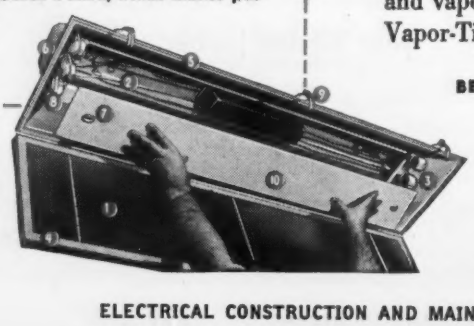
of locations with Adverse Atmospheric Conditions



Specify "SEALED-FLO *40*"

THESE 10 BENJAMIN FEATURES ASSURE BETTER LIGHTING OF DUSTY OR MOIST LOCATIONS

1. A Double-Strength Grade "A" **Clear Glass Cover** also available with heat and impact-resisting glass.
2. **High Light Output**—Twin-Lamp Units have an efficiency of 67% or more of the output of the lamps; Triple-Lamp Units 61% or more.
3. **Porcelain Enamel** on all inner reflecting surfaces, combining a high reflection factor of 82% with a high diffusion factor.
4. **Dust-and-Vapor-Tight Seal** formed by wire reinforced woven asbestos gasket.
5. **"Sealed Bead" Construction,** which resists rust and corrosion.
6. **One-Piece Steel Construction,** completely covered with easy-to-clean **Porcelain Enamel.**
7. Self-adjusting, hand-operated **"Lok-Latch" Fasteners,** which permit easy removal of the reflector plate.
8. Exclusive, unbreakable **"Spring-Lox" Lampholders,** which facilitate relamping and lock lamps into position.
9. **Three Spring Tension Clamps,** which allow easy opening of the cover.
10. **Removable Reflector Plate,** which makes possible easy access to control equipment and wiring.



"Sealed-Flo 40" Fluorescent Lighting Units are designed to solve the problem of how to provide modern lighting in locations where conventional-type fluorescent units do not meet with Underwriters' Laboratories approval. To these many locations in industry where atmospheric conditions are adverse or hazardous, "Sealed-Flo 40" Twin-Lamp and Triple-Lamp Units bring the full benefits of modern fluorescent lighting.

Under such severe operating conditions "Sealed-Flo 40" Units function at peak efficiency and at minimum operating and maintenance cost. Important to such performance is the "One-Piece" construction with an over-all protective coating of durable, easily cleaned Benjamin "Life-Time" Porcelain Enamel.

"Sealed-Flo 40" Units satisfy all requirements of Underwriters' Laboratories for installation in Classes II, III, and IV hazardous locations. Such locations may be found in flour and feed mills, grain elevators, coal chutes, cotton gins, wood-working plants, warehouses storing baled waste, cocoa fibre, Spanish moss, etc., as well as all departments where combustible dusts may create fire or explosion hazards and where maintenance due to dirt and vapor is a problem. "Sealed-Flo 40" Units are also rated as Vapor-Tight by Underwriters' Laboratories.

BENJAMIN ELECTRIC MFG. CO., Dept. H, Des Plaines, Illinois

BENJAMIN

Lighting Equipment

Distributed Exclusively Through Electrical Wholesalers

R-3173

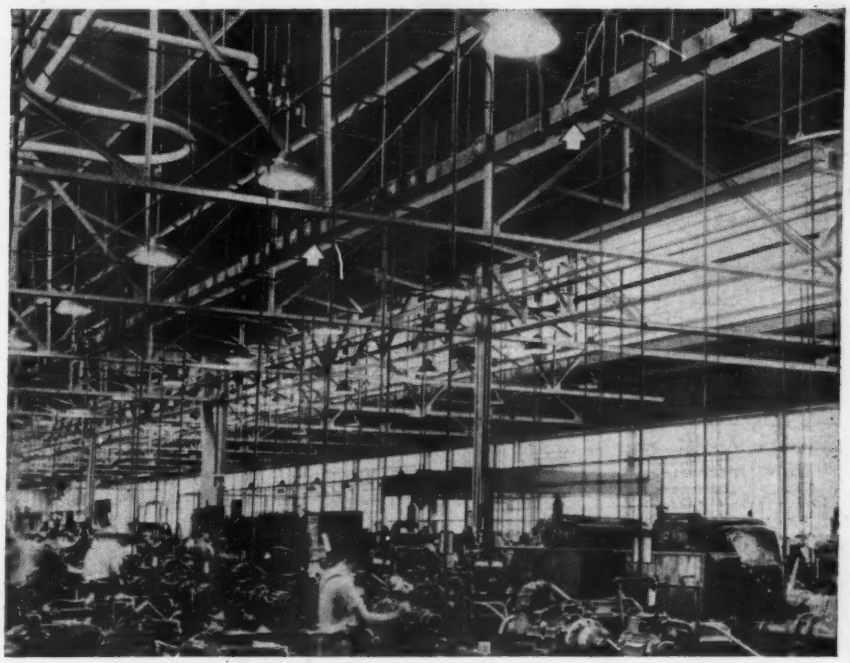
Industrial Electrification

ENGINEERING • INSTALLATION • MAINTENANCE

Bus Duct Distribution—Part III

Engineering data for bus duct layout, estimation, specification and installation are essential in selecting and planning an efficient industrial electrical distribution system.

By R. N. Blatchford
BullDog Electric Products Co.
Detroit, Michigan



In the huge ordnance plant pictured here, miles of bus duct and thousands of protective plugs were installed to serve the production areas located in 14 separate buildings. Simplicity and efficiency of distribution system (arrows) made it possible to install power ducts as soon as roofs were in place.

BILL of materials and price estimate are taken directly from layout drawings. For clarity and identification each feeder and circuit is assigned a number which appears on both drawing and estimate sheet. System plan is thereby broken into segments (i.e., Circuit No. 1, Circuit No. 2 etc.) for ease in estimating.

Duct runs are estimated in lineal feet, measuring from center line to center line. Fractional footages are considered at the next higher foot (example: 76′-5″ of 400 ampere 3 pole duct is priced as 77′-0″ of 400 ampere 3 pole duct).

Total demand amperage for any portion of system will seldom coincide with standard rating of duct; specify next larger size (example: total demand amperes 312 amperes—400 ampere duct next larger size). In many cases the difference between presently required capacity and duct rating will provide sufficient future reserve capacity.

Information required in price estimating is generally included in manufacturer's catalogs and price bulletins.

Specifications

Specifications are written for most proposed jobs. Here are typical specifications for a plug-in duct system.

"Provide a complete system of interconnected duct runs containing bus bars with current take-off devices spaced as indicated by single line drawing shown on plans and riser diagram.

"Sections are to be made of standardized units, so formed that the complete assembly shall be rigid in construction and neat and symmetrical in appearance.

"The duct sections shall be provided with standard hangers as indicated on the plans; however, rods or straps for connecting between the standard hangers or holes in the duct flanges and the building structure are to be fabricated and furnished on the job by the installer.

"Interconnection of adjacent casing ends and bus bars shall be made by means of neatly fitted scarf lap joints and all joints or splices in bus bars shall be made with standard bolted connections.

"Suitable handholes with covers are to be provided on both sides of each 10-foot section of duct along the bus runs permitting accessibility and ease of bus bar connection of adjacent duct sections.

"Bus bars shall be fabricated from best grade 98 percent conductivity pure copper. All contact surfaces shall be silvered and shall have maximum contact areas and pressures.

"Current take-off or plug-in openings shall be spaced at convenient intervals along both sides of the casing and shall be so designed as to insure proper polarization of the plugs in respect to bus bars and to prevent undue inductive heating. Not less than 10 plug-in openings shall be provided for each 10-foot section.

"Current take-off devices or plugs shall be approved design, interchangeable for fuse, switch and fuse or cir-

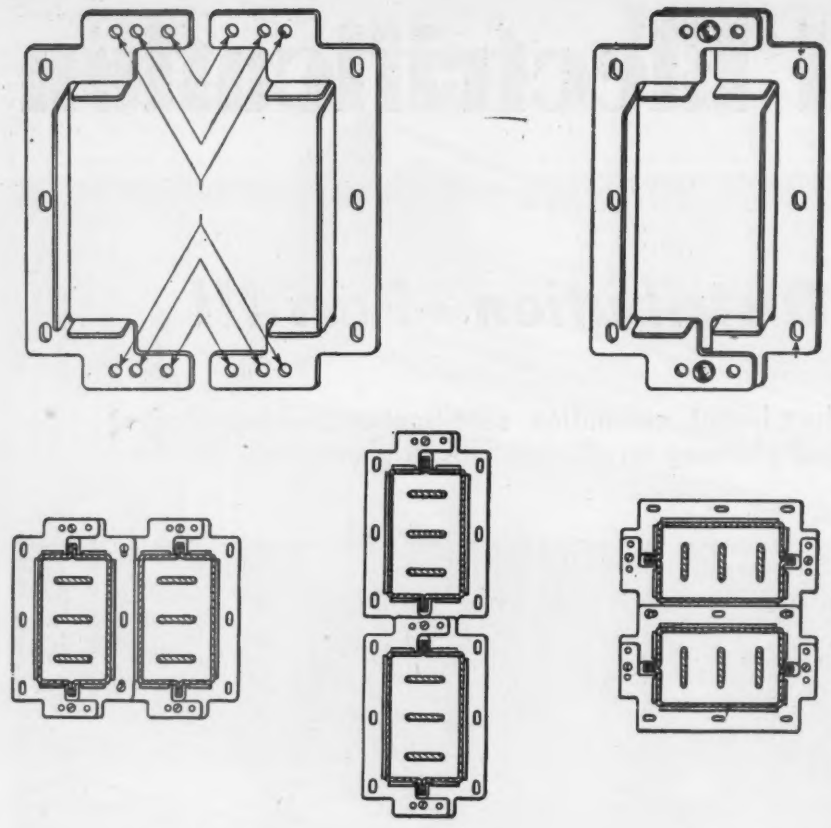


FIG. 9—Clamp hangers can be adjusted to a variety of duct sizes by utilizing different combinations of bolt holes in the hanger frames. Hangers can be used for either edgewise or flat mounting of single ducts, or for mounting several ducts in parallel.

Attach hanging rods, straps, messenger cable, etc., wherever convenient.
Roughly position Clamp Hanger on Plug-in Duct.
Raise Plug-in Duct section, align the Clamp Hanger and supporting means, and bolt.

FIG. 10A—Typical installation starts by fastening supporting rods at convenient locations. Hangers are then slipped over duct casing and bolted together. After duct sections are individually raised to proper installation level by block and tackle, clamp hangers are moved along duct for exact alignment and are bolted to supporting rods.

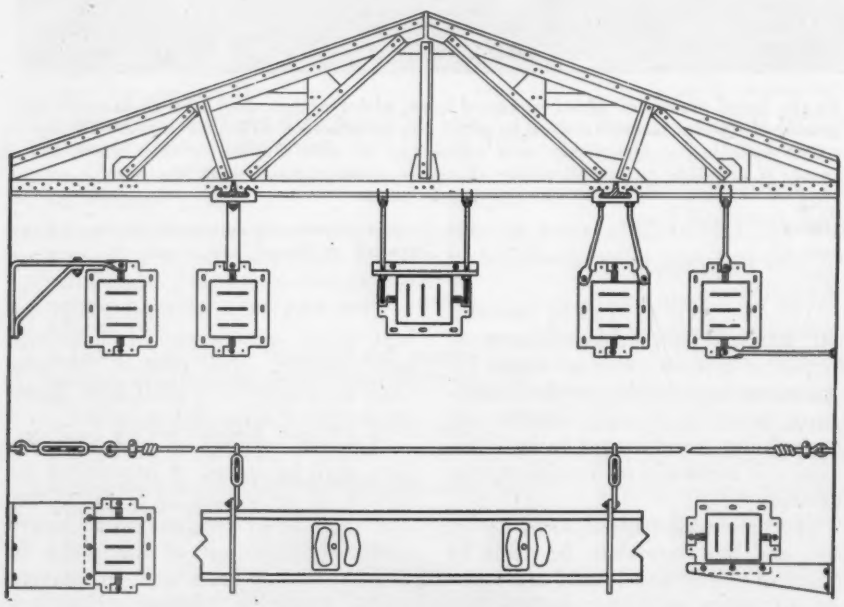


FIG. 10—Plug-in bus duct can be supported in a number of ways with exact methods depending upon type of structure construction. Although steel rods or straps are most commonly used, angle irons and messenger cable with turnbuckles serve specific applications. Installation is as follows: supporting rods placed in position, clamp hangers fastened, duct sections raised, hangers adjusted, bolts tightened.

cuit breaker type when desired. Plugs shall be of ample capacity to accommodate their respective circuits as shown on the riser diagram.

"The interconnected duct runs shall carry the approval and label of the National Board of Fire Underwriters and shall be of the type ——— as manufactured by ———."

Installation and Mounting

As previously pointed out, layouts submitted to factory are painstakingly checked for errors or misapplication of products before materials are fabricated or assembled for shipment. While the order is being prepared for shipment, engineers and draftsmen are making up installation drawings. These drawings will be forwarded with the order and simplify erection of the system. Installation numbers are assigned to fittings and special lengths, these numbers appearing on shipping containers as well as drawings. The contractor is thus enabled to keep track of all material and to have special section or fittings at hand when

they are needed. Every piece is made to fit the spot for which it was designed—the installer need only mount the pieces where specified and bolt them together.

Bus duct is usually suspended from ceiling or overhead structural steel work, but it can be mounted against columns or along walls. Standard clamp hangers for plug-in duct are used in any type of mounting and permit either flatwise or edgewise installation of duct. (Fig. 9). Hanger holes in duct flanges provide a ready means for attaching auxiliary supports where this is advisable. Supporting rods or straps, angle irons, clamps, turnbuckles, messenger cable or other supporting members as desired are purchased or made by installer to fit individual installation requirements. (Fig. 10).

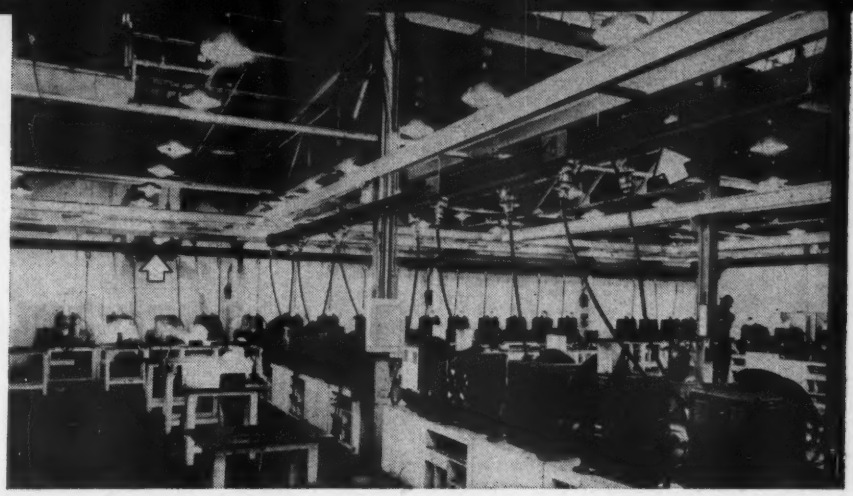
Here is typical procedure for installing plug-in bus duct.

1. Supporting rods (or other supporting means) are fastened to ceiling, wall or building structure at desired locations.
2. Clamp hanger halves are slipped over duct casing at approximate locations and bolted together.
3. Duct sections are individually raised by block and tackle to proper installation level.
4. Clamp hangers are moved along duct for alignment and bolted to supporting rods.
5. Bus bars and steel casings of adjacent sections are bolted together and handhole covers fastened in place.

Feeder duct, because of its size and weight, requires trapeze hanger arrangements or similar support. These also are fabricated by installer to fit particular needs and result in impressive savings in both time and manual labor required to place and secure the distribution system in its proper position in the plant. Complete mounting instructions, obtainable from the manufacturer, guarantees an approved installation.

Irrespective of type of mounting, simplicity and speed with which bus duct can be installed results in appreciable savings in time and manpower. These savings are even more marked during any subsequent system changes when the vital factor of lost production time is also a consideration.

Manufacturers with an eye on tomorrow look to bus duct for electrical power distribution, for this modern highly flexible bus duct system is engineered for present and future needs. Day by day, more and more of the country's largest production plants are installing bus duct for electrical power.



Short runs of cable from overhead switch plugs to machines cuts voltage drop, and unused openings in duct system indicate flexibility of system and provisions for rearrangement or expansion.

Substantially dust and moisture proof, damage resistant and with maximum safety, such compact duct runs as the one illustrated above can reduce installation and maintenance costs and provide high salvage value.

Plug-in bus duct installations provide flexibility for lighting layouts also, particularly so when fixtures are suspended from a parallel trolley duct installation which permits rapid shifting of luminaires as illumination requirements vary. Trolley feeder systems, consisting of standard or heavy-duty sections can be fed from transformers served by plug-in bus duct runs.

DATA SHEET

The number at the right is a classification for convenience in filing and for a future data sheet index

B-1

Feeder Breaker Selection

By using simple Nomogram you can plan your load center unit substations.

It's easy to select the correct air circuit breaker for any application of a standardized load center unit-substation with the use of the Nomogram on page 118, it requires only 3 settings of a straight edge. But, despite its simplicity, the Nomogram is extremely flexible. The effect of varying any one of the determining factors is easily seen by sliding the straight edge from one value to another.

The Nomogram has been constructed from A.I.E.E. standard formulas for the determination of short circuit currents and applies to the three locations in which air circuit breakers are used. Namely:

(1) Main breaker
(2) Feeder breaker, cascaded
(3) Feeder breaker, direct connected.

INSTRUCTIONS FOR USE OF MOMOGRAM

Before the proper size air circuit breakers can be determined, the following factors must be known:

(1) Primary short circuit capacity
(2) Transformer rating in kva.
(3) Secondary voltage
(4) Connected motor load.

Load center transformers are designed with the following impedances which are considered along with the transformer kva. in the Nomogram:

Kva.	Percent Impedance
100 to 150 inclusive.....	4.0
200	4.5
300 to 500 inclusive.....	5.0
750 to 2000 inclusive.....	5.5

TO DETERMINE SIZE OF FEEDER BREAKER

(1) Place a straight edge on the value of primary short circuit capacity and on the transformer rating on the abscissa, finding a point on Reference Line I. If an infinite system is assumed, place the straight edge on the value of the transformer kva. and perpendicular to the axis of transformer kva.

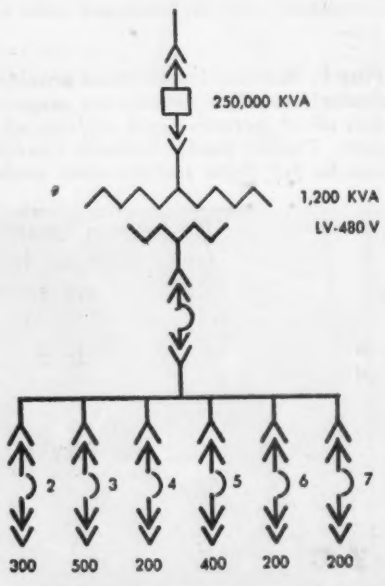
(2) Using this point and the kva. of normally connected motor load, find a point on Reference Line II. Motor load may vary from zero kva. to the full transformer rating. (100 percent motor load is usually assumed for 240, 480 and 600 volt systems and 50 percent motor load for 208Y/120 volt systems.)

(3) Using this point on Reference Line II and the value of the secondary voltage, the rms. value of the secondary short circuit current will be found as well as the breaker with the correct interrupting capacity for direct-connected or cascaded feeder breakers.

(4) Check continuous current ratings given on chart of breaker sizes to be certain that breakers with necessary interrupting capacity as determined by Nomogram have adequate continuous current carrying capacity. The load on each leader circuit determined this current.

TO DETERMINE SIZE OF MAIN BREAKER

Place a straight edge between the points for the proper transformer kva. and secondary voltage on the top Nomogram. This gives the correct breaker size for the main breaker; and also the transformer full load secondary current.



HERE IS A PRACTICAL EXAMPLE

Proposed load center unit substation to feed six 480-volt circuits with 100 percent motor load, requiring currents as indicated in diagram. Dotted lines in Nomogram indicate procedure for determining interrupting capacity of the breakers.

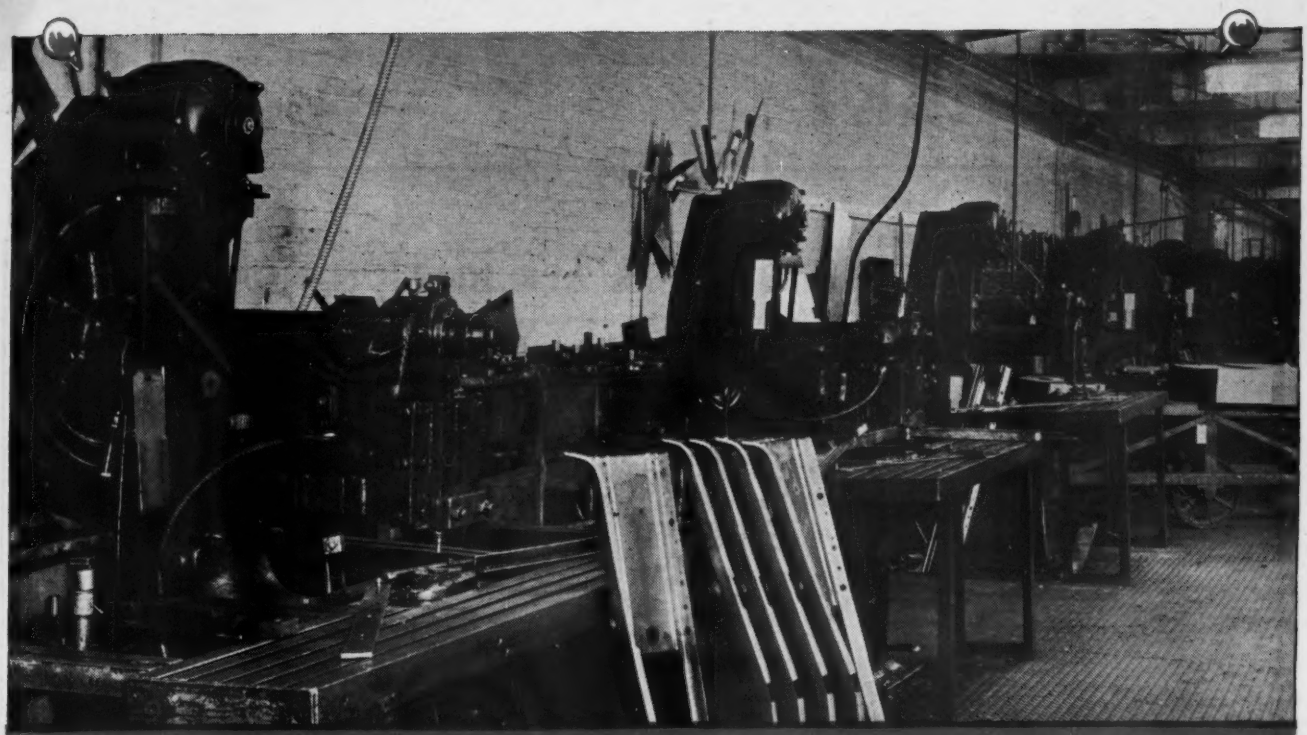
(1) Lay a straight edge between primary short circuit capacity of 250,000 kva. and transformer rating of 750 kva. Reference Line I is intersected at 13.0.

(2) Place straight edge between 13.0 and 750 kva. on the line for kva. normal motor load. This locates a value of 16.0 on Reference Line II. (If only 50 percent of the load were motor load, the straight edge would have been placed between 13.0 and 375 kva., giving a value of 14.5 on Reference Line II. Rest of the procedure would have been unchanged.)

(3) Place the straight edge between 16.0 and 480 volts (value of transformer secondary voltage) and read value of secondary short circuit current as 24,000 amps. Cascaded feeder breakers Numbers 2 to 7 must have interrupting capacity of at least 15,000 amps.

(4) Interrupting capacity of main breaker (No. 1) is determined by placing straight edge between 750 kva. and 480 volts on top Nomogram. This indicates a secondary full load current of 902 amps. and a transformer secondary breaker having interrupting capacity of 50,000 amps. (5) Breakers of 15,000 amperes interrupting capacity have continuous current ratings up to 225 amperes. Feeder breakers 2, 3 and 5 exceed this maximum rating. Therefore, these 3 feeders would use 25,000 amps. interrupting capacity breakers to get the required continuous current carrying capacity. Feeder breakers 4, 6 and 7 would be 15,000 amperes interrupting capacity.

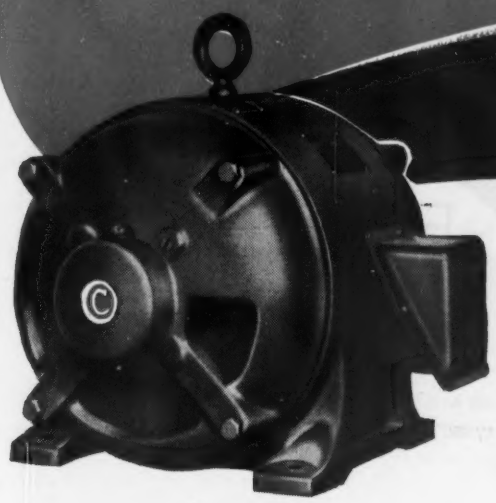
Prepared by Allis-Chalmers Manufacturing Co.



The Correct Century MOTOR

Helps Keep Punch Presses on the Job-

✓ Maintain High Production at Low Operating Cost



Popular types and standard ratings are generally available from factory and branch office stocks.

The illustration above shows eight Century 1½ horsepower general purpose squirrel cage motors operating small punch presses. The operations performed on these presses are highly repetitive, with comparatively short intervals between strokes—and require a small amount of energy per stroke.

However, for large presses with heavy impact and comparatively long intervals between power strokes, Century offers high torque, high slip, squirrel cage motors. These type SCT motors smooth out the load curve; save wear on the presses.

Century builds a complete line of electric motors in a wide range of types and kinds, in sizes from 1/6 to 400 horsepower.

Specify Century motors for all your electric power requirements.

613

Century C MOTORS

CENTURY ELECTRIC CO. • 1806 Pine Street • St. Louis 3, Mo.

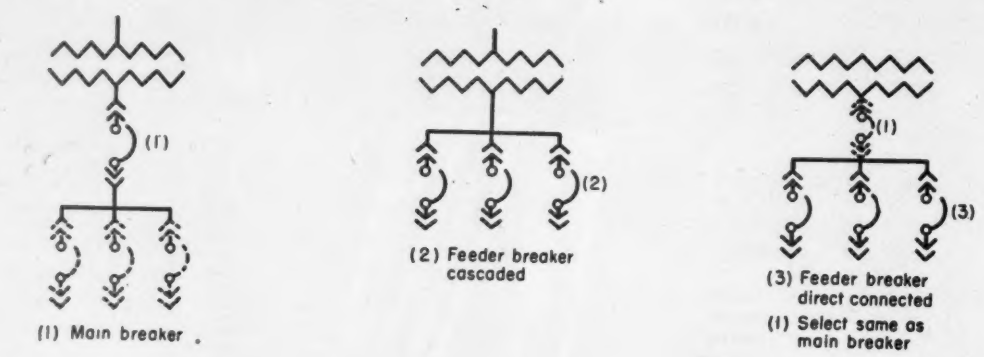
Offices and Stock Points in Principal Cities

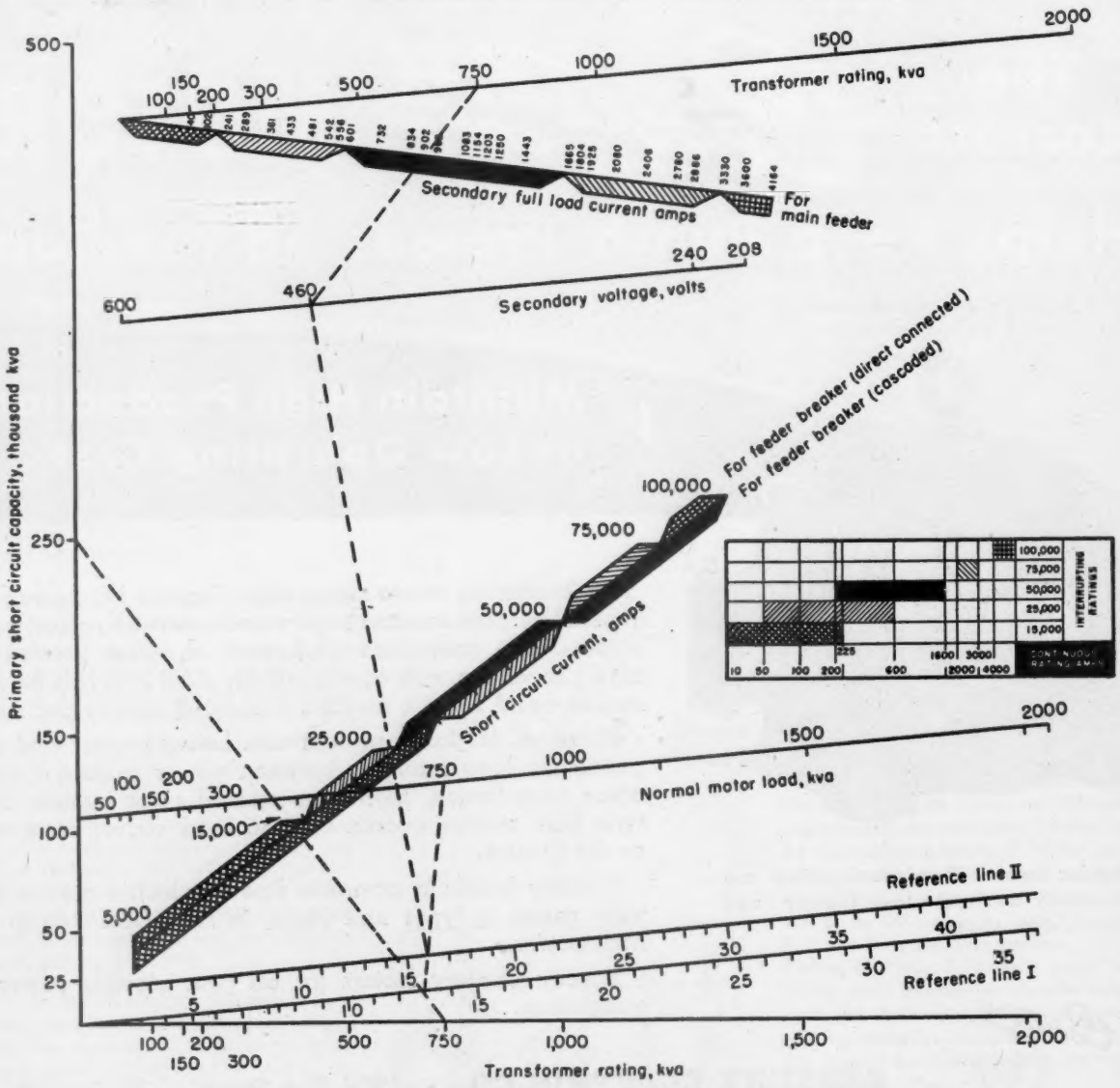
DATA SHEET

The number at the right is a classification for convenience in filing and for a future data sheet index

B-2

SECONDARY CIRCUIT BREAKER APPLICATION NOMOGRAM





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Wherever you need a slow speed drive, there's much to be gained from the simplicity of the Motorgear. It weighs less, it takes up less space . . . it is easier to apply, install and service than any other slow speed unit in its class. Its Axial Air Gap Motor is a true 40° C. Motor. Above all, the Motorgear is as outstanding in performance as it is in its new, advanced design. Fairbanks, Morse & Co., Chicago 5, Illinois.

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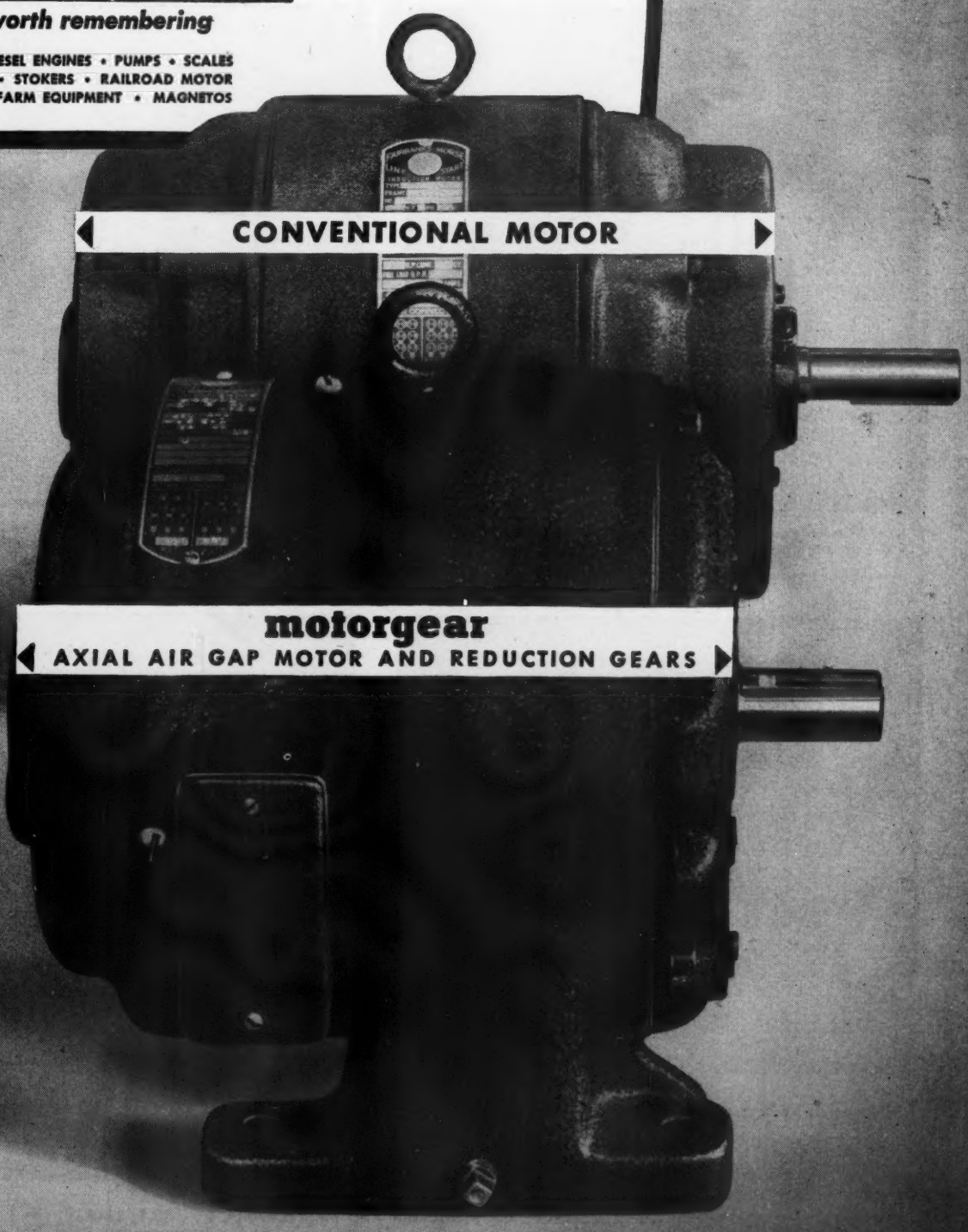
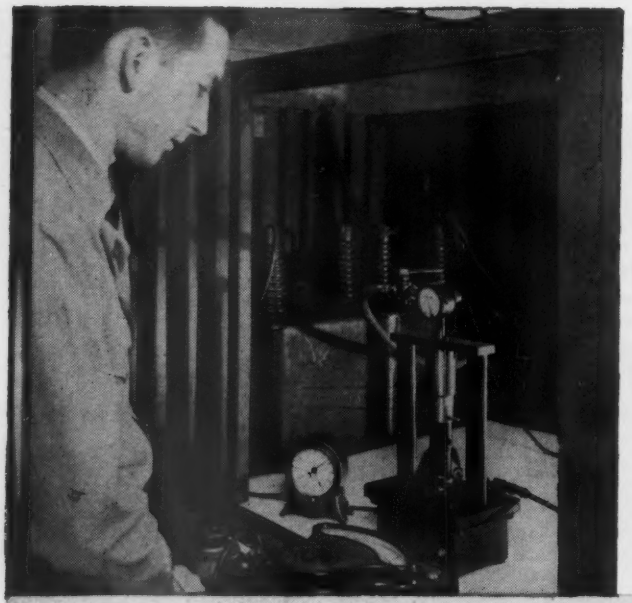


If you need

but are cramped for space



Samples from each lot are tested for dielectric strength and are required to withstand 1000 volts per mil at room temperature.

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● How to get the most power from the smallest cable is a problem continually being faced by electrical engineers. The improved varnished cambric wires and cables offer a happy solution in many cases.

The varnished cambric used by American Steel & Wire Company is being recommended for operating temperatures up to 85°C. (185°F.). In this respect it is notably superior to rubber . . . permits greater current carrying capacity. It also has higher dielectric strength which results in cables of smaller outside diameter. In multiple conductor cables, part of the insulation may be applied in the form of a belt, thus reducing outside diameter still further. These features permit varnished cambric cables to carry substantially more power for their size than rubber insulated cables.

The fact that oil and grease do not damage varnished cambric insulation makes it widely used for motor and generator leads, transformers, regulators and oil circuit breakers. It is particularly desirable for heavy power lines in power plants, factories and mills.

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For complete information on the many types of U·S·S American Varnished Cambric Cables, write for our technical booklet.

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UNITED STATES STEEL

QUESTIONS from readers on problems of industrial equipment, installation maintenance and repair. Answered by electrical maintenance engineers and industrial electrical contractors out of their experience. For every question and every answer published, we pay $5.00.

Reader's Quiz

Watt-Hour Meter

QUESTION 314—We have watt-hour meters on individual feeders, in order to allocate energy costs to various departments. However, it would often times be an advantage to know the approximate energy requirements of a particular machine within a department, and I have in mind using a portable single-phase watt-hour meter, together with split-core current transformer, and a 115 volt tap off a lighting circuit for potential. Assume the load to be a 600 hp., 2300 volt, 120 amp., 3 phase synchronous motor. The current transformer will be 200/5 amps. The watt-hour-demand meter is rated 100/5 amps., 2400/120 volts, 60 cycle, 2 wire, 1 phase. Kilowatt-hour multiplier is 100, and full scale on demand meter is 400 kw. Can this equipment be used for determining the approximate energy and demand requirements, and what multiplying factors should be used?—W.E.T.

A. TO QUESTION 314—The meter described has a designed transformer ratio of 400, (2400/120=20) x (100/5=20). A gear train was chosen to give the convenient dial constant of 100. The demand register, as described, is direct reading, or has a dial constant of 1.

A new multiplier dictated by the use of other current and potential transformers can be found from the formula:

$$K = \frac{k_d \times k_p \times k_e}{k_o}$$

where

K=new dial or reading constant
k_d=original dial or reading constant
k_p=new potential transformer ratio
k_e=new current transformer ratio
k_o=product of original current and transformer ratios as rated.

If the potential coil was excited from a lighting circuit as proposed, k_p would be the ratio between the voltages of the power and lighting circuits.

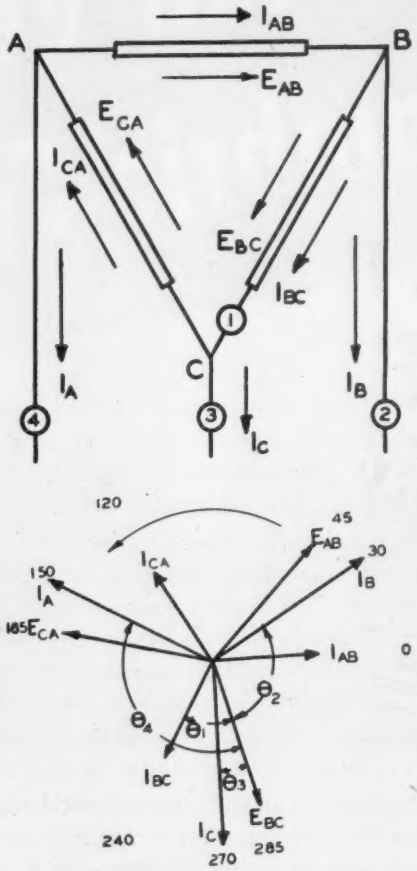

Fig. 1 shows a circuit diagram with positions of the meter current coil, or current transformers, at 1, 2, 3, and 4. The vector diagram, assuming balanced conditions with the phase current lagging the phase voltage by 45° is shown in Fig. 2. The numbers around the periphery of the vector diagram are electrical degrees in advance of the reference vector, I_{AB}.

The power measured by a wattmeter is the product of the current in the current coil, the voltage across the potential coil, and the equivalent cosine of the angle between current and voltage. Hence, power factor or phase angle do not enter into determination of reading constant.

With the four positions for the current coil, and assuming that the potential coil is excited by E_{BC}, there are four possible readings for a single-phase meter measuring three-phase power. This is due to the four phase angles shown. The number of readings can be enlarged by (1) reversing either current or potential coils, (2) placing the current coil in the other phases, (3) moving the potential connections to other phases. Also, in proposal to connect the potential coil to a lighting circuit, there is doubt as to the phase angles between the lighting and power system voltages. All, but a connection in any one phase such as BC, involve unknowns—which, even if known, require complex calculations for a correction factor.

If the current coil can be connected at "1" and the potential coil cross Phase BC, under balanced conditions total power would be 3K times the reading of the meter, where K is determined as explained as above.

Since this is generally an impracticable connection, the best solution would be to use a polyphase watthour meter. In a three-phase, three-wire system, the current transformers would be connected at 4 and 2, and the potential transformers at 4-3 and 2-3. In determining K, the ratios of *only one set* of current and potential transformers are used, e.g., two 20/1 potential transformers and two 5/1 current transformers would give a transformation multiplier of 100, to be used with k_d and k_o.—L.E.B.

A. TO QUESTION 314—You can use 1 single phase wattmeter for a balanced 3 phase load such as a 3 phase motor by connecting the potential coil to a voltage which varies the same as the motor voltage, and is in phase with the current lead. One side of a 4 wire 3 phase 120-208 volt transformer will work if you choose the leads that give the highest reading. A low resistance lamp Y connection will be more accurate for the purpose. Multiply the result by 3, to cover the 3 phases. Then multiply the result by 40, to cover the current transformer, then by 20 to cover the voltage difference or use a multiplying factor of 2400 to cover everything. The demand meter scale will have to be multiplied by 6 to cover the 3 phases and the 200 amp. current transformer. Don't overload the transformer.—H.S.

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MB49-3

ELECTRICAL EQUIPMENT AND AUTOMOTIVE BRAKE PRODUCTS

Cutting Out Coils

QUESTION 315—What effect will it have on the performance of a three phase dip-ring or squirrel-cage induction motor if, in making emergency repairs, like cutting out one or more grounded or shorted coils in the stator, say for example, two coils must be cut out and these two coils are a complete pole-phase group? Will the motor run at the right speed with a complete pole missing?—W.A.B.

A. TO QUESTION 315—If one coil was cut out, the phase voltages would be unbalanced and the angular phase relation destroyed, similar to an open-delta connection of transformers. This would cause a smaller magnetic field of opposite direction to be induced; this would cause excessive heating by increasing the iron loss. Low power factor and low torque would also result. If the entire pole phase group is cut out, it would be the same as changing from one speed to the next higher division without having the proper amount of turns, chording and other important changes necessary for a new winding. The irregular spacing of the remaining poles may cause such magnetic distortion as to make the motor inoperative, and is not advised.—J.V.H.

A. TO QUESTION 315—The effect of cutting out a number of turns or coils of a motor winding would be the same as increasing the terminal voltage. The extent of the over-voltage would be equal to the voltage drop across the turns cut out.

Most motor manufacturers design their motors to operate 10 percent above or below the name plate rating, therefore, when cutting out a defective coil, care must be taken to stay within this limitation. When a coil or coils are cut out of a three-phase motor, the same number of coils should be cut out of each phase, and in a symmetrical sequence around the stator bore to avoid unequal currents between phases. For example, assume a three-phase, four pole, 36 slot stator has one faulty coil and it is desired to cut this coil out. This winding consists of three coils per pole per phase. It is found that one coil cut out of each phase would have the same effect as increasing the phase voltage approximately 8 percent, therefore, satisfactory operation may be expected. Designating the defective pole group as phase "A", group 1, proceed in a clockwise direction, a coil occupying the same position as the defective coil should be cut out of phase "B", group 2, and phase "C",

Wagner DRY-TYPE Transformers *Reduce* Power Distribution Costs

Typical construction of two-winding dry-type transformers through 10 kva, and dry-type auto-transformers through 25 kva. These sizes can be installed indoors or outdoors.

A 100 kva two-winding dry-type transformer, showing typical construction used in the larger units, which are designed for indoor service only.

Modern manufacturing and lighting methods demand steady voltage with minimum line losses. The safest, most efficient way to get such power *where* you need it—*when* you need it, is to install Wagner dry-type transformers.

These dry-type transformers have many lighting and power applications. They should be used in preference to liquid-filled transformers because no special vaults are required—even in locations where fire hazards are present. They are compact and light in weight—easy to install. You get the benefits of lower insurance rates and lower installation costs.

Twenty-nine branches, located in principal cities, are at your service for consultation on your transformer problems and offer speedy, nationwide service facilities. For full information on Wagner Power and Distribution Transformers, write for Bulletins TU-180 and TU-181.

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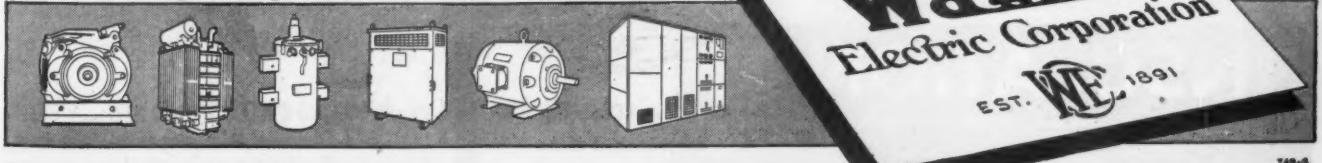
Consult Wagner Engineers on all Transformer Problems



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group 3. The defective coil should be cut in two at both ends of the stator to avoid possible heating from induced currents.

When the motor has only one coil per pole per phase or an entire pole-phase group is bad, the coil or coils must be replaced to make the motor operative.—T.B.B.

A. TO QUESTION 315—The motor will work like a single phase motor, which means that the speed will be o.k. on condition that the load is low, since the current in the good winding will be increased. For the bad winding you will have to insert a resistance to limit the current in the good coils or you will burn out the good coils in that phase.—H.S.

Converting Fan Motors

QUESTION 316—I have a 6 fan d-c .034 amp. each Modine hot water heater system in a plant. The service is 110-220 a-c single phase 60 cycle. How can I change the a-c to d-c inexpensively?—J.A.S.

A. TO QUESTION 316—The question does not state the d-c voltage of the fan. If the d-c voltage is 110, there is an exceedingly simple way of converting the .034 amps of d-c required. A small selenium radio type of rectifier can be purchased for under $1 and will deliver up to 100 ma. Larger rectifiers can be obtained up to .25 amp quite cheaply.

The idea would then be to bring a-c to the fan, and convert the a-c to d-c right at the fan terminals.—H.H.S.

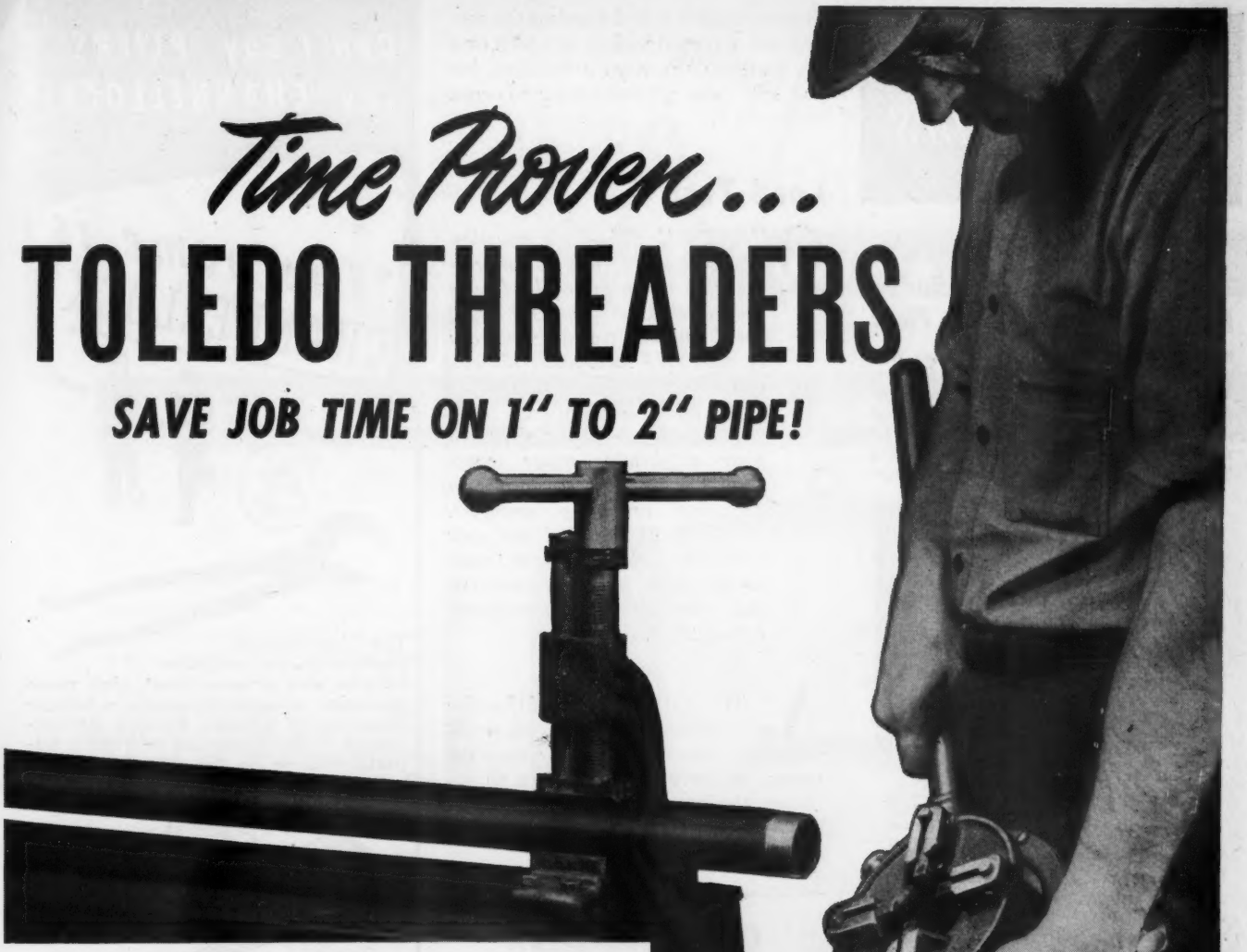
A. TO QUESTION 316—If the six d-c fan motors referred to by J.A.S. are located in the one hot water heater mentioned, he has a rather simple problem. While he does not state the d-c voltage required, since he has available as high as 220 volts, single phase, the easiest solution is to use a properly designed stack rectifier (selenium) to change from the 110 or 220 volts a-c to provide the required total current (6x.034=.204 amps). If the motors are started simultaneously, some over rating will be required to provide starting current.—W.B.M.

A. TO QUESTION 316—A rectifier will be cheaper in first cost, but higher in future costs, because you will have to pay for current losses due

Time Proven...

TOLEDO THREADERS

SAVE JOB TIME ON 1" TO 2" PIPE!



Toledo No. 1BR Adjustable Ratchet Threader, 1" to 2" Pipe.

Here are the 1" to 2" tools preferred today by thousands of better mechanics . . . genuine TOLEDO THREADERS!

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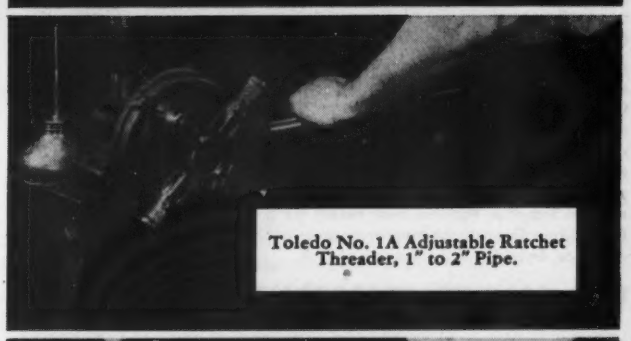
. . . *Toledo 1BR Ratchet Threader,* similar to the 1A . . . in addition, has pipe holder with broad faced chuck jaws easily set by wing-head thumb screws . . . assures accurate centering and firm grip.

. . . *Toledo SIMPACT Self-Contained Tool* . . . outstanding for easy operation . . . one set of high speed steel dies does the work of four . . . no loose parts . . . sizes changed instantly.

Tool up *right* with TOLEDO—hand tools or power equipment—for every pipe fitting requirement! You'll save time, save labor, cut costs! The Toledo Pipe Threading Machine Co., Toledo, Ohio. New York Office, No. 2 Rector Street Building.



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Toledo SIMPACT—self-contained, adjustable threader, 1" to 2" Pipe.

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Silicone News

DC SILICONES

DC 44 Silicone Grease Ends Bearing Failure in Textile Plant

Bearing failure may burn out your motors, stop your entire production line or ruin a mill run. That's why it's front page industrial news when the Plant Manager of a large textile plant reports that he has not had a single bearing failure since he started to use Dow Corning Silicone Oils and Greases over 30 months ago.

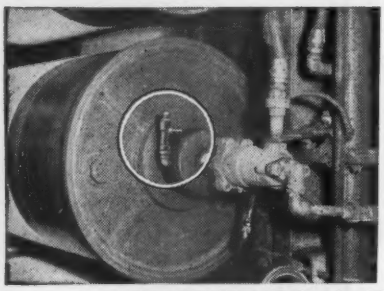

PHOTO COURTESY AMERICAN FINISHING COMPANY

DC 44 Silicone Grease in ball bearings on drying cans, operating at 400 r.p.m. around saturated steam journals, has 45 times the life of the organic grease previously used.

Typical of the lubrication problems that plague plant engineers in textile plants is the maintenance of "steam-heated" bearings. It used to be necessary to lubricate bearings on drying cans and the main cylinder bearings of Sanforizing machines once every 8-hour shift. Since American Finishing started to use DC 44, the re-lubrication schedule has been cut to once every 30 to 45 shifts. The lubrication of Slashers on textile mills presented a similar problem that has been solved by using DC 44.

On tenter frame chains and races that travel through ovens at 400°F., petroleum oils carbonized so rapidly that the chains had to be cleaned periodically. That costly operation and the need for continuous lubrication have been eliminated by a weekly application of DC 710R Silicone Fluid.

American Finishing, like many other skillfully engineered companies, has found that Dow Corning Silicone lubricants more than pay for themselves in reduced maintenance costs. Increased production due to the virtual elimination of bearing failure is another one of the many bonuses Dow Corning Silicones pay to modern industry. For the most recent data on DC Silicone Greases phone our nearest branch office or write for data sheet No. D5K.

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to converting a-c to d-c unless the motors are universal motors in which case the motors don't need a rectifier, but you still have a commutator to work with.—H.S.

Load Test

QUESTION 317—This question has come up recently in our testing unit, when taking load tests over weekly periods. Our "split core" current transformers are of the 250/5 ratio while the circuit we are concerned with varies from 300 to 700 amperes. It is impractical to open the circuit to plate a variable range transformer in it. Now we do have a 15 amp. recording ammeter. Would it be practical and safe to use the 250/5 split core transformer with the above ammeter, thus overloading the transformer?—L.R.D.

A. TO QUESTION 317—Use long enough No. 14, 16, or 18 secondary meter leads to increase the range, or leave the core open to increase the range. You will have to calibrate the meter under the new conditions.—H.S.

Can you ANSWER these QUESTIONS

QUESTION V14—Seeking perfect stable voltage we placed a constant voltage transformer in series with an electronic (tube type) voltage regulator and ended up with a far more varying voltage than we obtained with either one alone. Can anyone account for this? Both regulators are in perfect condition.—L.R.D.

QUESTION W14—I have two ammonia compressors, now started in two steps by hand control, which I would like to change to automatic starting under load. A 5 in. by 5 in. compressor is driven by a 10 hp. motor. The compressor is 2-cylinder and turns 300 rpm. The motor is simple 3-phase induction. A 2-cylinder compressor turns 290 rpm., and is also driven by a 3-phase induction motor of 20 hp.

Since the motor torque is insufficient for cross-line starting, and unloading for starting is out of the question, what kind of controls would I need to start these units automatically under load?—G.H.

PLEASE SEND IN YOUR ANSWERS BY JUNE 15

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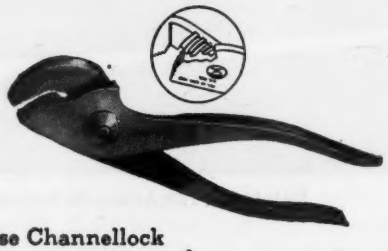
The Channellock pliers with our exclusive tongue and groove joint give more features. Greater Strength — Longer Wearing — Closely Spaced Adjustments — Self Cleaning — Visible Adjustments — No Wear on Joint Bolt.



Use Channellock for your repair needs— electrical, plumbing, ignition, battery, automotive, and aviation work.

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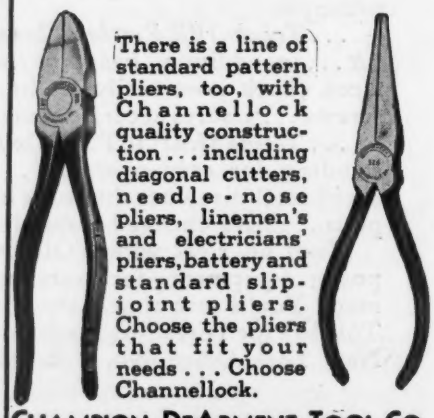

There is a line of standard pattern pliers, too, with Channellock quality construction . . . including diagonal cutters, needle-nose pliers, linemen's and electricians' pliers, battery and standard slip-joint pliers. Choose the pliers that fit your needs . . . Choose Channellock.

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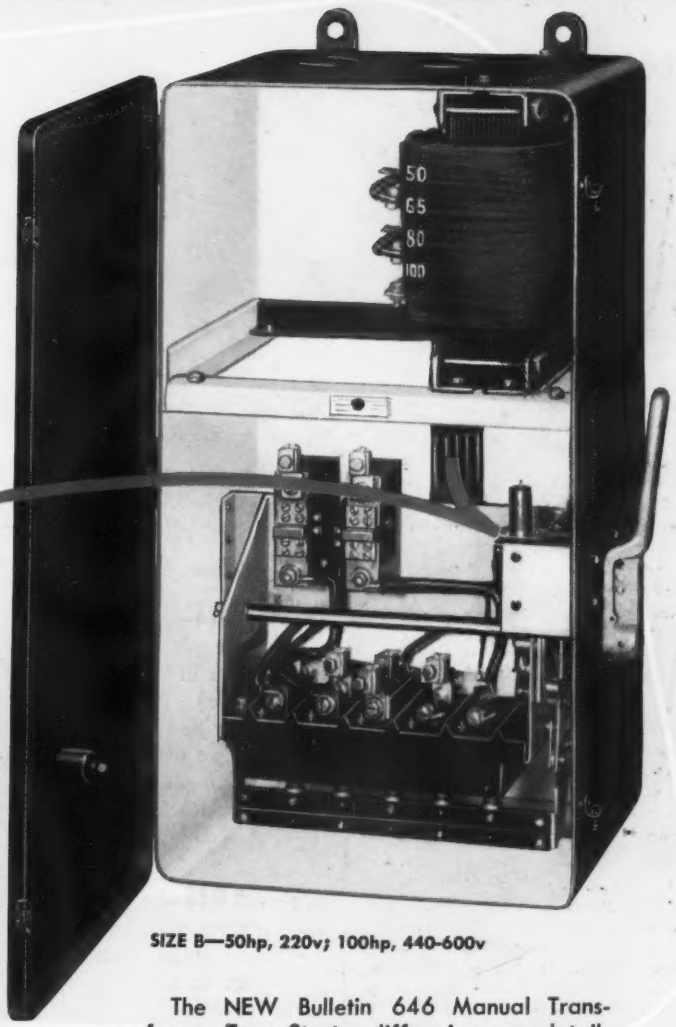
NEW

Bulletin 646

Manual Transformer-Type Reduced-Voltage Starter

Here is the first outstanding improvement in manual transformer-type starters in twenty-five years. It is a worthy addition to the Allen-Bradley line of motor controls.

An unusual feature is its adjustable time delay, which prevents careless operators from switching the motor too quickly to full running voltage. Many other features are described on the next page.



SIZE B—50hp, 220v; 100hp, 440-600v

The NEW Bulletin 646 Manual Transformer-Type Starter differs in many details from older types of reduced-voltage starters.

Time-tested developments . . . like Allen-Bradley double break, silver alloy contacts . . . assure long, trouble-free service. See next page for further details.

Allen-Bradley Co., 1316 S. Second Street, Milwaukee 4, Wis.

ALLEN-BRADLEY

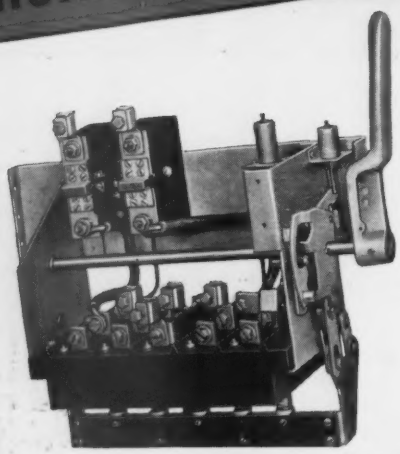
BULLETIN 646 TRANSFORMER-TYPE STARTER

QUALITY

TURN
see next page

EXCEPTIONAL FEATURES *of the*

Bulletin 646 Manual Transformer-Type Starter



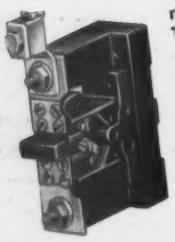
TIME DELAY SWITCHOVER

The Bulletin 646 switching mechanism is a simple, mechanical linkage operated by a two-position, manual starting lever. When the lever is pulled forward, the switch mechanism moves the contacts into the "Start" position. This permits the motor to accelerate at reduced voltage.

An interlock, under dashpot control, prevents the starting lever from being thrown into the "Run" position until the motor has accelerated for several seconds. This timing is adjustable to suit varied starting conditions.

No-voltage protection is also provided by a magnetically operated hold-in latch. Man, motor, and machine are fully protected against accidents and damage from line failures.

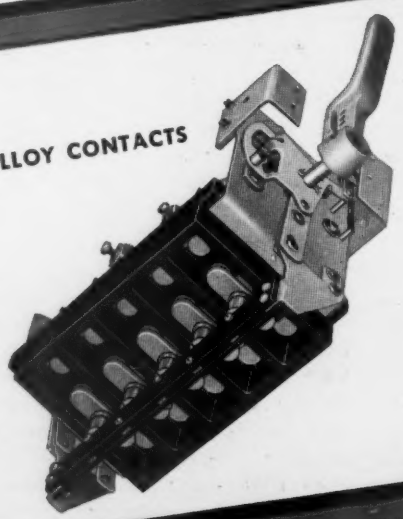
DEPENDABLE OVERLOAD RELAYS

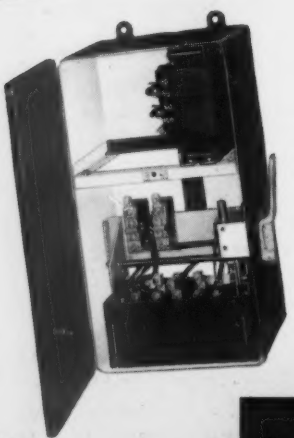


The accurate, reliable overload relays operate on the soldered ratchet principle. They remain reliable in operation, even after long inactivity. Thermal elements available for any load. Contacts are pure silver.

DOUBLE BREAK, SILVER ALLOY CONTACTS

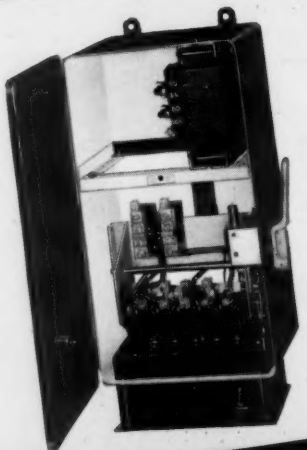
Starting and running contacts are mounted in a molded contact block. Double break, movable contacts are attached to copper spanners, spring-mounted on an insulated rocker arm. In the starting position, the movable contacts bridge the motor and reduced voltage contacts. In the running position, they bridge the motor and line voltage contacts. Easily accessible for inspection.





CAN BE SUPPLIED WITH OIL-IMMERSED CONTACTS

For installations requiring oil-immersed contacts, Bulletin 646 Transform.er-Type Starters can be supplied with an oil tank, inserted through the bottom of the enclosure. The tank is suspended on threaded studs, which serve as hangers when the tank is lowered. Since contacts immersed in oil deteriorate much more rapidly than when operated in air, air-break starters are preferable for most applications.



Allen-Bradley Co., 1316 S. Second St.
Milwaukee 4, Wis.

TURN

see front page

Send for Bulletin 646

ALLEN-BRADLEY

Reduced-Voltage Starters for Squirrel-Cage Motors

QUALITY

Answered by
F. N. M. SQUIRES
Chief Inspector
New York Board of Fire Underwriters
New York, N. Y.
and
GLENN ROWELL
Electrical Engineer
Fire Underwriters Inspection Bureau
Minneapolis, Minn.

Questions on the Code

Flexible Conduit

Q. *I have been asked to wire a prefabricated house and the plans which the manufacturer furnishes call for the use of $\frac{3}{8}$-inch greenfield. We have no local electrical inspector, but I do not believe the Code would approve. Has there been any change in that rule?*—S.B.R.

A. No, the Code under Section 3503 states the minimum size of flexible metal conduit shall be not smaller than $\frac{1}{2}$ inch trade size with a few exceptions, no one of which could be used to justify the use of $\frac{3}{8}$ inch flexible conduit in the prefabricated building where the electrical installation is made in the field.—G.R.

Service Switch

Q. *My first farm wiring installation was turned down and among the several things the inspector found fault with was the location of the service switch in the barn. He claims this switch must be located outdoors. It seems to me that a switch outdoors would be more dangerous than a switch inside, but I cannot find anything in the Code covering the location of such switches. Any help you can give me will be appreciated.—P.H.*

A. Ordinary service switches consist of steel cabinets with either a plated or painted finish and in addition certain steel parts are also part of their assembly. Due to the highly corrosive atmosphere common to buildings housing livestock, the useful life of such a device may vary from a matter of months to a number of years, depending entirely on local conditions. Because of this corrosive condition, some R.E.A. projects now require that the service switch be placed outdoors. Some require only rain-tight equipment, others accept ordinary cabinets when protected from the weather by a wooden enclosure open on the bottom. Possibly there may be a switch cabinet available some day which will withstand the atmosphere common to these buildings, but the only ones which will withstand it now are far too expensive for such use as they have been designed for industrial use and consist of heavy cast metal enclosures.—G.R.

An Inspector's Reaction

Q. *I am unable to determine the reason for permitting the use of service cable on range and water heater circuits only, in interior wiring systems. If its use had been restricted to service entrance only, there would be more people speaking to each other in this City and in this County:*

My contention is, that if the service cable is fused at the point of entrance, and the neutral grounded there, that it should be permissible to continue with service cable to a distribution cabinet located anywhere in the building. Excepting the fuse capacity, this would duplicate the condition existing where a range service is carried an equal distance within the building.

The stipulation that it may be used as a feeder from a master service cabinet to supply other buildings, is interpreted here to mean that the cable must leave the building at the master cabinet—and believe me brother,—I've seen two pairs of pliers thrown through the window when I said that the service cable from the fused switch at the point of entrance to the distribution panel had to be replaced with armored cable or non-metallic sheathed cable, also when used to supply clothes' driers.

I realize that the service entrance cable used here, can have the insulated conductors distorted by bending edgewise with a short radius and may force some of the bare neutral wires into the insulation.

I have been twisting wire since 1916 from Wisconsin to Panama but have had no experience with dwelling and commercial wiring except for the small amount done on the construction and excavating projects where I was employed, most of the work in mines, dredging equipment, etc.

I have been with the inspection bureau here since June of last year, and I like the work, and it is my home town.

There is no doubt some good reason for Section 3382 requirements, as there are for the rest of the Code, but it would help my "personal relations" with the contractors if I could offer a logical reason for the requirement.

True, interpretations are often left to the local enforcement authority, and I have debated or argued the question with our own chief inspector but I am not convinced and any explanation you have to offer, will be greatly appreciated.

I just happened to think that the service cable neutral load will be more continuous and probably greater than on the range cable—but it still don't make sense to me.—W.J.I.

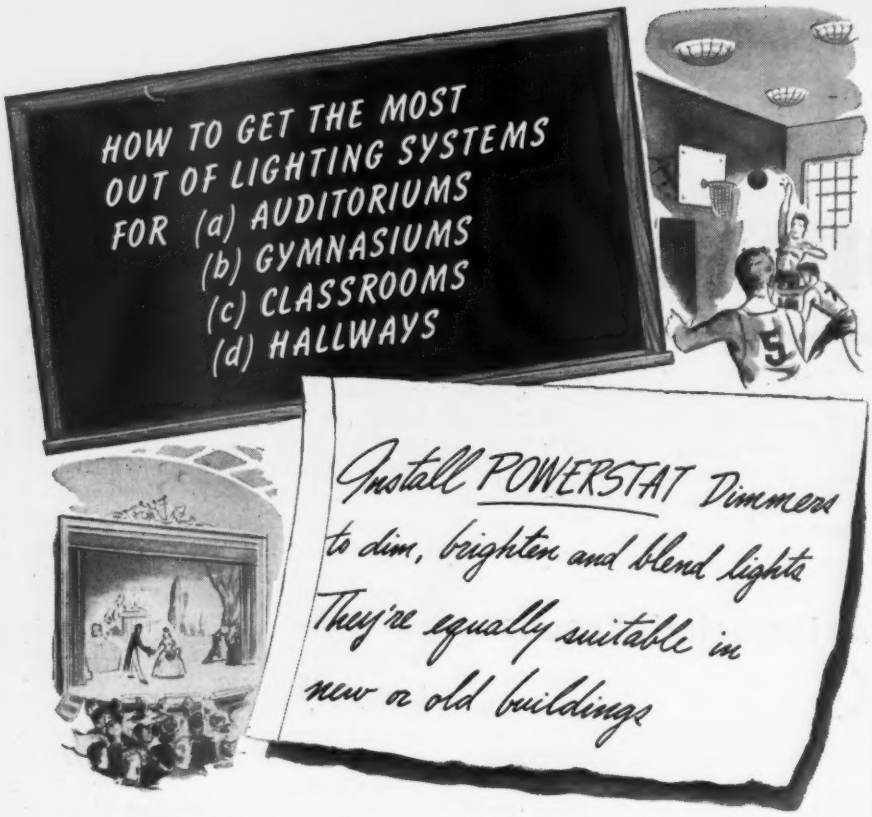
A. Certain interests have been endeavoring for years to have the Code permit the use of a bare neutral throughout our wiring systems. Other interests have opposed this.

The use of the bare neutral conductor, or the covered but uninsulated neutral, in service work was one entering wedge in this campaign. Then the use of the uninsulated but covered neutral of a service entrance cable extending to a range, was the next wedge which was driven in a little further, when the domestic water heater circuits were added. Again the door was wedged further open when "feeders from a master service cabinet to supply other buildings" was added.

It may bruise your heart to learn that the service cable used as a feeder from a master service to another building, does not have to immediately leave the building at the master cabinet, but may run through this first building.

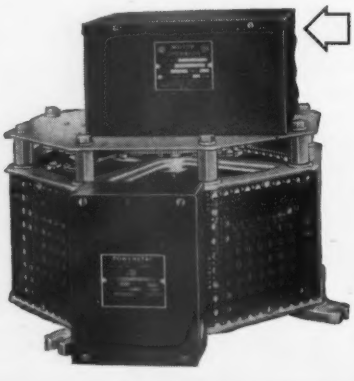
The argument against the promiscuous use of a bare neutral, is that it is not desirable, nor considered safe, to have return currents leaving the neutral pathway and finding its way back through devious and diverse ways over building structures, various pipings, metal ceilings, etc.

But cheer up, maybe some day things will get themselves straightened out and everyone will be happy.—F.N.M.S.



You'll get more out of your lighting systems — more out of your buildings — with POWERSTAT light dimming equipment installed in your school lighting circuits. Auditoriums equipped with POWERSTAT Dimmers find more evening use for plays, social and civic functions. Gymnasiums are made more suitable for dances, parties and bazaars when lights can be dimmed, brightened or blended to suit the occasion. Extra activity means more frequent rentals — increased income from units otherwise unprofitable.

Classroom lighting, when controlled by a POWERSTAT Dimmer, can be set to the most effective levels to accurately offset poor natural lighting conditions. Hallway lighting can be increased to full brilliancy for class changes — dimmed to economical levels when traffic loads are negligible.



POWERSTAT light dimming equipment is simple to install — easy to operate. By merely pushing a button the desired light level is achieved. Push-button stations can be placed at any convenient location.

We'll be glad to send you complete information on how POWERSTATS *can be used in your plans for school lighting — write us today.*

WRITE 6059 DEMERS AVENUE, BRISTOL, CONNECTICUT

THE SUPERIOR ELECTRIC CO.
BRISTOL, CONNECTICUT

Powerstat Variable Transformers • Voltbox A C Power Supply • Stabiline Voltage Regulators.

Appliance Circuit

Q. *I recently was given a franchise for an appliance line which includes an automatic washer operated by a one-third horsepower motor. This motor when attached to a circuit protected by an ordinary fuse of 15 or even 20 amperes capacity will sometimes open the fuse if the circuit is supplying other loads. After some investigating, I found that either 15 or 20 ampere time delay fuses would do the job unless the circuit was actually overloaded. Now the local inspector refuses to let me install 20 ampere time delay fuses even though the circuit consists of No. 12 wire and is definitely an appliance circuit and insists that a separate circuit be run to the laundry wherever the 15 ampere time delay fuse will not do the job. This extra cost spoils the sale in most cases, yet I can find nothing in the Code that says a 20 ampere time delay fuse can be used on the appliance circuit. Where is this covered in the Code?*—M.M.

A. Section 2115, paragraph b, provides for the use of No. 12 conductors on appliance circuits, and Section 2123 grants permission to use receptacles rated at 15 amperes on a 20 ampere appliance circuit. Therefore the Code provides for the use of a 20 ampere overcurrent protective device on the appliance circuit. Section 2125 states the total connected load of the circuit shall be limited to 80% of the rated capacity of the circuit if motor operated appliances are connected. Therefore if a circuit consists of No. 12 conductor and it does not supply medium base outlets but only receptacles in the locations specified for appliance circuit outlets under Section 2124 and if the total connected load, including your washer, does not exceed 16 amperes, the Code would permit the use of a 20 ampere Type S fuse of the time delay type.

As an appliance dealer you should consider the value of a separate circuit to the laundry, at least in the better class homes, even though the Code may not require it as that will assist in the sale of a dryer or ironer at some future date.—G.R.

Residential Wiring

Q. *I appreciate very much the interpretation on the code that you gave me some time ago. In a recent meeting with the local examining board and the inspector, a question came up on the requirement for a main switch ahead of the multi-breaker if there were more than six circuits in*

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

Lightweight, plastic CD-80 and CD-160 fluorescent luminaires for schools are maintenance "timesavers". It's easy to relamp—remove or adjust the starters—from the top, without touching the reflector.

This is but one of many features of the famous CD Series designed especially for schools. Be sure of good illumination as well as lasting performance. Specify Westinghouse to get the same engineering skill and manufacturing experience found in all Westinghouse products.

To get the complete story, send for B-4075 to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. Send today for a Westinghouse Lighting Engineer to help with your planning. J-04256

Westinghouse

PLANNED LIGHTING PAYS

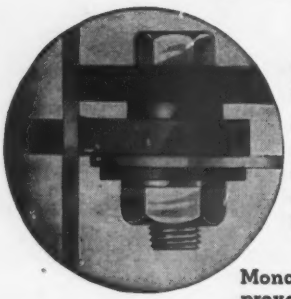
New POSITIVE LOCK Construction of Monarch Renewable Fuses

Assures → TRUE ALIGNMENT

The brass lugs inside the caps used on Monarch Fuses (see illustration at right above) fit into equally spaced slots in the brass casing inserts. This new and improved Monarch construction assures true alignment of the copper holding terminals . . . and establishes a positive lock on both ends of the fuse.

and for

STILL GREATER PROTECTION . . .



MONARCH'S Compressed Tension Lock Washer construction (illustrated at left) compensates for contraction and expansion of the fibre bar by exerting constant tension on the bar . . . and assures no loose parts. The washer also separates the fibre bar from the copper terminals . . . a spacer to provide better cooling.

Monarch Fuses are fully approved and are available through recognized wholesalers.

Specify Monarch Fuses *for improved* FUSErvice

MONARCH FUSE CO., LTD.
118 E. FIRST ST., JAMESTOWN, N. Y.

the multi-breaker. Of course we understand that six switches can be used without a main switch.

In residential wiring, would the double pole breaker for the range and the double pole breaker for the water heater be considered as a single switch or as two switches? For instance we will assume a small home with four single pole breakers, one double pole breaker for range and one double pole breaker for water heater. Would this be considered as six or eight switches?

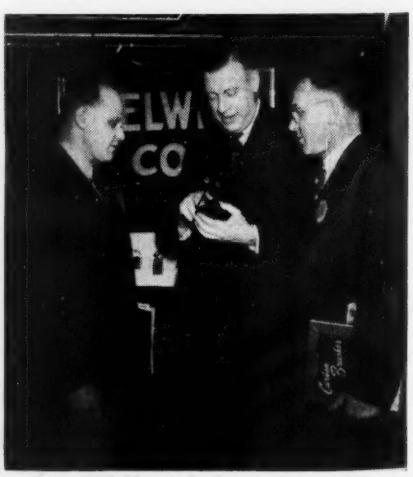
If it is considered as eight, then a main switch or breaker would be required in front of the multi-breaker, but if it would be considered as six, then the multi-breaker alone would be sufficient—G.T.B.

A. The double pole breaker operating from a single handle, is a single switch and the single pole breakers, each operating from a single handle, are each a single switch.

Therefore with the four single pole breakers, one double pole breaker for the range, one double pole breaker for the water heater, there is a total of six switches, which the Code permits as service equipment. One simple way to remember how to decide, is to count the number of manual operations necessary to disconnect the current from the entire house. In the case mentioned above only six operations are necessary, which is the maximum permitted by the Code.—F.N.M.S.

Bonding Jumper

Q. *In the January issue of this column you said a bonding jumper was required around all con-*



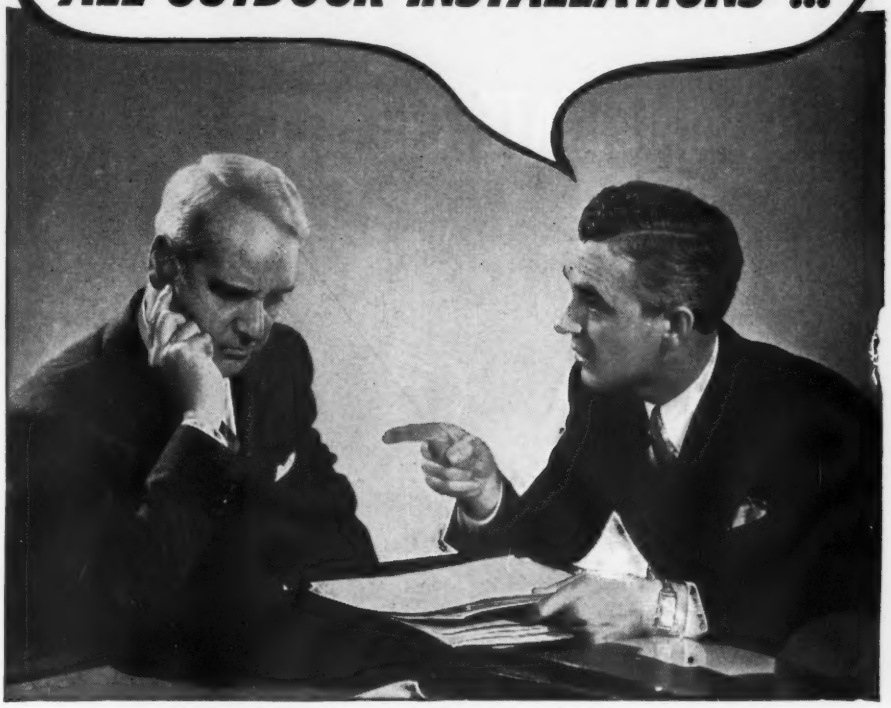
Shock pad of neoprene on carbon brushes is demonstrated by W. O. Helwig (center) Helwig Co., to Elmer E. Mohaupt, electrical engineer, Harnischfeger Corp., Milwaukee; and C. Zastrow, electrician, Nash-Kelvinator Co., Milwaukee.

New executives of the Minnesota Electrical Association elected at recent conference in Minneapolis are: (L to R) Director and immediate past-president—G. L. Haugland, Western Electric Service, Appleton; vice-president—C. D. Burton, Burton's Inc., Brainerd; president—John Engel, Foster Electric Co., Rochester, Minnesota.

centric knockouts, yet as I read the Code, such bonding jumpers are only required where the service conduit enters a concentric knockout in the service cabinet. How about this?—P.C.R.

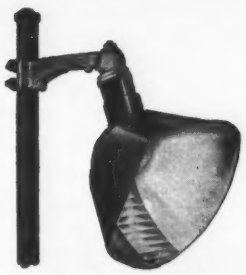
A. You are correct in your assumption that Code Section 2572d refers only to services on systems where the voltage to ground does not exceed 150 volts. However, under Section 2575 we find the general requirement that any loosely jointed part of a metallic raceway system must be provided with a bonding jumper of some type to assure grounding continuity. There are, of course, several different types of concentric knockouts and some may provide sufficient grounding continuity but there are others which do not. In the event of an installation failing to clear a fault due to high resistance in the return path to ground because of a concentric knockout, there is little question but that the installing contractor could be charged with failing to comply with the Code requirements. The only assurance you as a contractor might have would be to either use bonding jumpers around all concentric knockouts or to provide the owner with an instrument check of the completed installation proving that the raceway system provided a minimum amount of resistance. I personally hope to see the time arrive when the Code will require contractors to make instrument checks on completed installations.—G.R.

"IT PAYS TO USE THEM BECAUSE THEY ARE RIGHT FOR ALL OUTDOOR INSTALLATIONS"...



QUAD LIGHTING

ANGLE REFLECTORS FOR SIGNS



FLOODLIGHTS FOR AREA LIGHTING

POST TOP OR PUMP REFLECTORS

Quad Units are easily wired and installed, quickly detachable for cleaning. This complete line provides the correct unit for most outdoor lighting requirements. Each unit is highly flexible in design, fully weatherproof and the porcelain finish is permanent.

Rely on QUAD for thoroughly modern installations whether Angle Reflectors for signs—Floodlights for area lighting or Post Top or Pump Reflectors.

QUADRANGLE MFG. CO.

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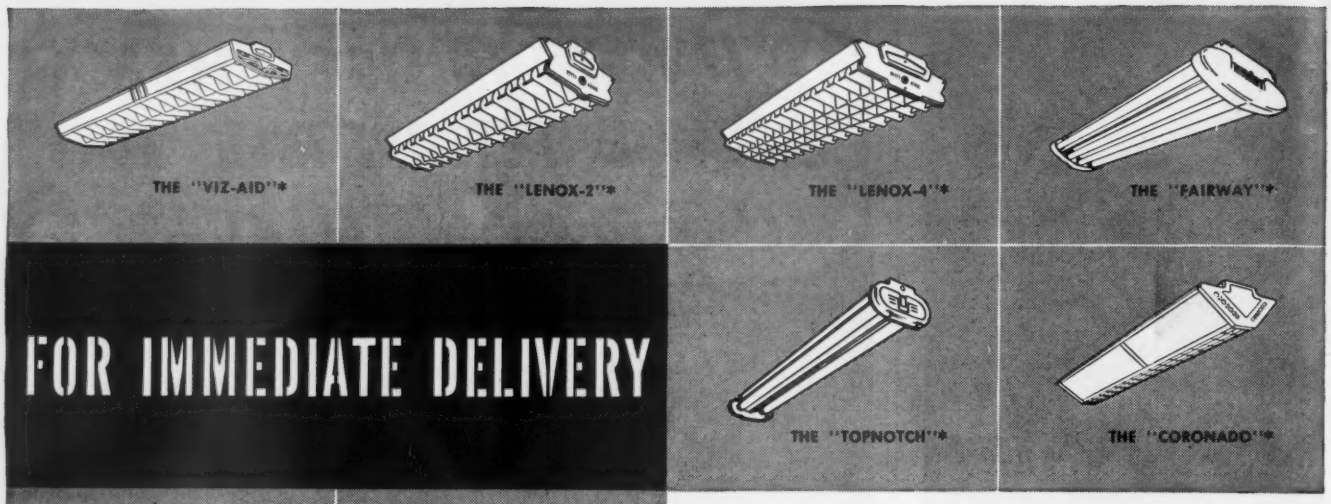
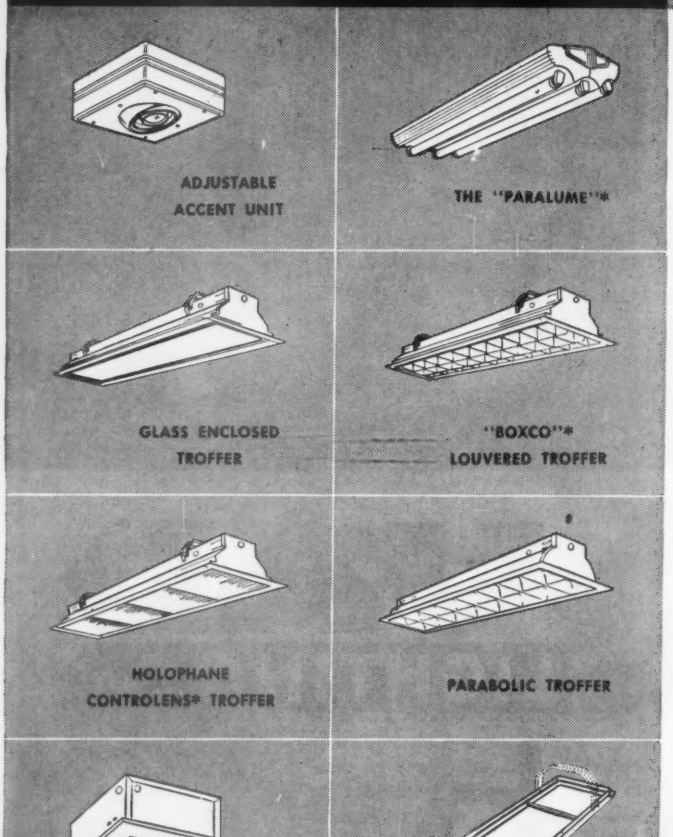


FOR IMMEDIATE DELIVERY



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Add *immediate delivery* to the long list of Day-Brite advantages.

Distributed only through leading electrical suppliers, the complete Day-Brite line is *in stock* for your day-to-day convenience. Plant production is geared to give you unusually prompt delivery on large orders, too.

See your Day-Brite distributor or representative. Specify guaranteed Day-Brite fixtures for more profitable installations, for greater customer satisfaction. for *immediate delivery.*

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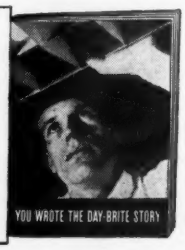
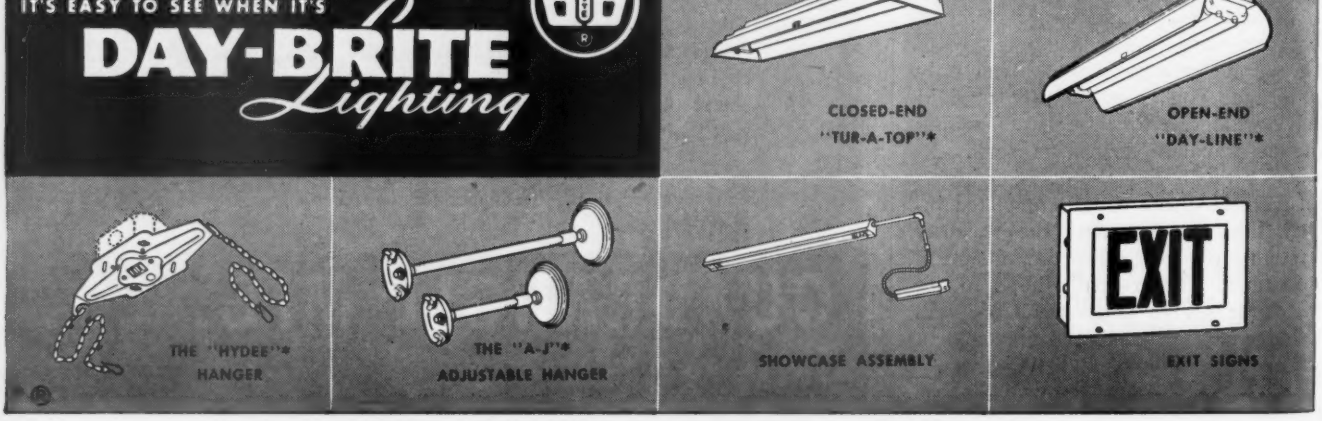


Day-Brite Lighting, Inc., 5402 Bulwer Avenue, St. Louis 7, Missouri
In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

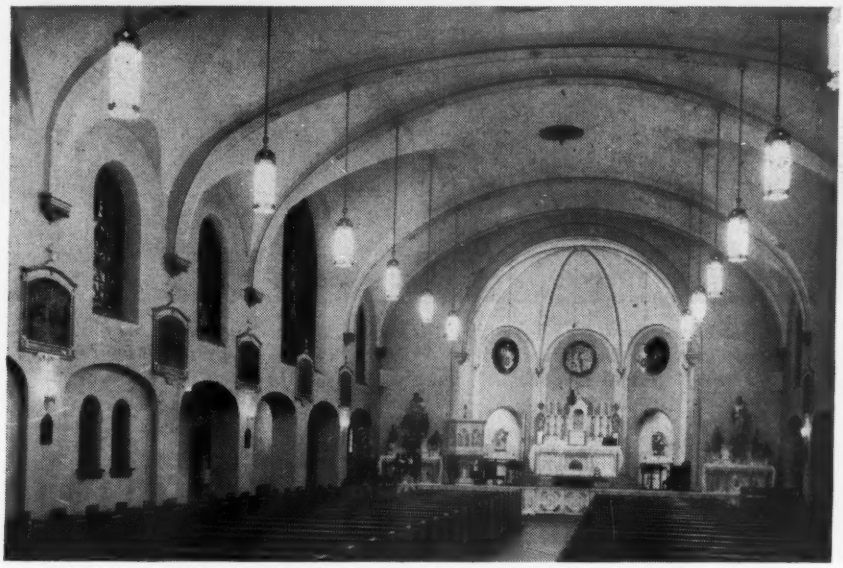
209

IT'S EASY TO SEE WHEN IT'S

DAY-BRITE *Lighting*



Modern Lighting



Ideal illumination results from careful planning when . . .

. . . A Chicago Church Relights

Lighting Results

- **Ample light permits reading with ease and comfort throughout pew area.**
- **No bright light sources nor glare are visible in normal viewing angles.**
- **The altar and pulpit areas are effectively accented with light.**
- **Light and lighting equipment harmonize architecturally and decoratively with the Romanesque church design.**
- **High efficiency and easy maintenance are inherent factors of the design and equipment.**

St. Willibrord's R. C. Church in Chicago has completely renovated its Romanesque interior. Renovation included redecoration, pew modernization, a new floor covering and relighting. All factors were carefully coordinated, so that each complements the other and results in a most pleasing and harmonious effect.

Relighting consisted of the installation of new lanterns in the nave, wall brackets on each side of the nave, close-up ceiling units in the two side aisles, and ornamental shields in the sanctuary. The selection of finishes for walls, ceiling, pews and floor covering, all having high reflection factors, contributed to a comfortable lighting result. In addition to providing a high utilization of light, the light color of the finishes provided low brightness ratios which diminish glare conditions and make seeing easier.

The church nave is 90 feet long, 40 feet wide, and has a barrelled ceiling which is 28 feet at the highest point. This area is illuminated with two rows of lanterns, seven in each row, and with eight wall brackets, four on each side of the nave. Each row of lanterns is equidistantly spaced between the side walls and the centerline of the church. This arrangement provides an even distribution of light over the entire pew area. The lanterns are installed approximately 18 feet above the floor, so that the light overlaps from adjacent units and provides a high degree of diffusion.

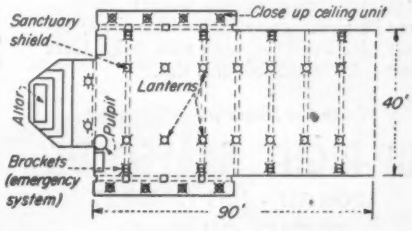
The use of two rows of lanterns creates a perspective which leads the eye to the focal point of the church, the high altar. It also accentuates the length of the church. The long single chain suspension on the lanterns also tends to accentuate the height of the church.

The lanterns are Romanesque in design to match the church architecture, and are made of wrought iron and brass. They are finished to harmonize with the decorative treatment of the church interior, that is, in gold with a crimson crown. The side glass panels are clear ivory with a white opal flashing which provides good diffusion and prevents a spotty appearance when lighted. The bottom of the lanterns are open, which makes maintenance easy. It also improves efficiency and provides greater eye-comfort, by eliminating the excessively bright surface of a diffusing medium or louver shield. The lamp is located sufficiently high to prevent it being seen at any normal viewing angle.

The wall brackets are adequately shielded so that a comfortable ratio of brightness exists between the lighted unit and its surround. They are connected to an emergency wiring circuit, for use in case of power failure in the standard lighting system.

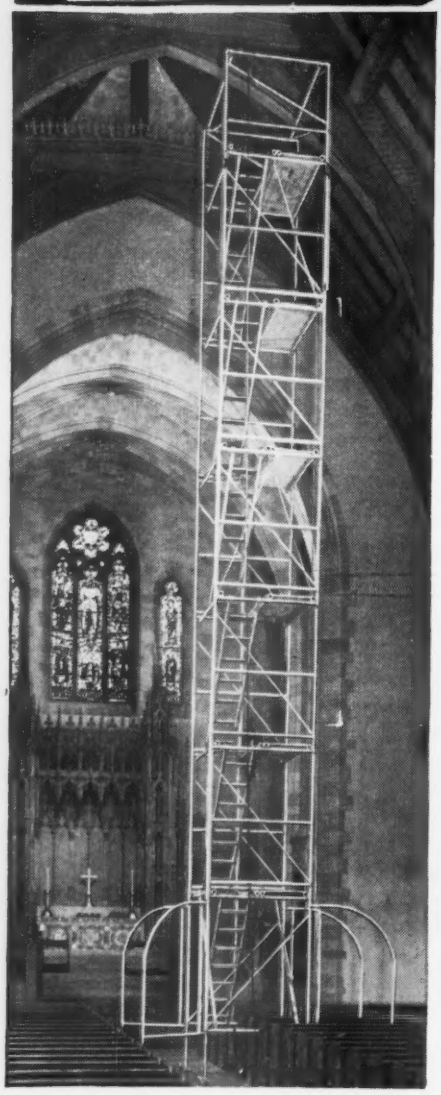
The sanctuary is lighted by means of two decorative pendant shields, back of which is used a 300 watt lamp concealed in a special design opal glass diffuser. Perforations in the shield permit enough light to spill on the front of the shield to light it softly so that the symbols may be seen. The lamps flood the sanctuary with light, making it brighter than the nave and accenting the altar. The diffusers minimize shadow effects and prevent glare in the eyes of the priest serving at the altar.

Sluis Electric Company, Chicago electrical contractors, planned the lighting for this church, in cooperation with Mason and Basedow, Chicago lighting consultants. Sluis Electric Company also sold and installed the lighting equipment, which was custom-built by the Rambusch Decorating Company, New York City.



Plan showing lighting layout for St. Willibrord's R. C. Church, Chicago, Illinois.

NEW!
Aluminum-Alloy
"UP-RIGHT" SCAFFOLDS
MOBILE 45' UNIT TAKES ONLY 15 MINUTES TO ERECT



Electrical work by Interstate Electric Co. in Trinity Church, Springfield, Massachusetts.

Rolled easily from position to position. Bridges obstacles with ease. A 7 foot, single section unit requires one man only a minute to erect; a 45 foot multiple unit only 15 minutes. Stronger than structural steel yet one-third the weight. Safety-tread stairway completely within the structure. No wrenches, wing nuts, bolts, loose parts. Each section folds flat.

Write for Descriptive Circular

UP-RIGHT SCAFFOLDS
ROOM 107 - 1013 PARDEE ST.
BERKELEY, CALIFORNIA
Offices in All Principal Cities

Long fluorescent units (16-foot) fit between truss spans and provide continuous row effect in this shop area. Each unit has eight 40-watt lamps (double row) in baked porcelain enamel steel reflector.

Long Reflectors Light Shop Area

A plant modernization program at The Liquid Carbonic Corporation in Chicago included a rehabilitation of the lighting system along with power distribution. Fluorescent units replaced obsolete incandescent units.

One manufacturing area was wired for 500-watt RLM incandescent units mounted on 20-ft. centers, 16 feet above the floor. Intensity on the working plane ranged from 10 to 12 footcandles.

To relight this area Robert B. Burton, supervisor of electrical maintenance and construction at Liquid Carbonic, designed and built special, long RLM type, fluorescent fixtures that would fit between the 20-foot span of the roof trusses. Each unit is better than 16 feet long; is made of steel with a white baked enameled reflecting surface; contains eight 40-watt, 3500° white fluorescent tubes. The units are suspended 13 feet above the floor (just above bottom chord of trusses) by four chain hangers and are fed by conduit drops from the original lighting outlets.

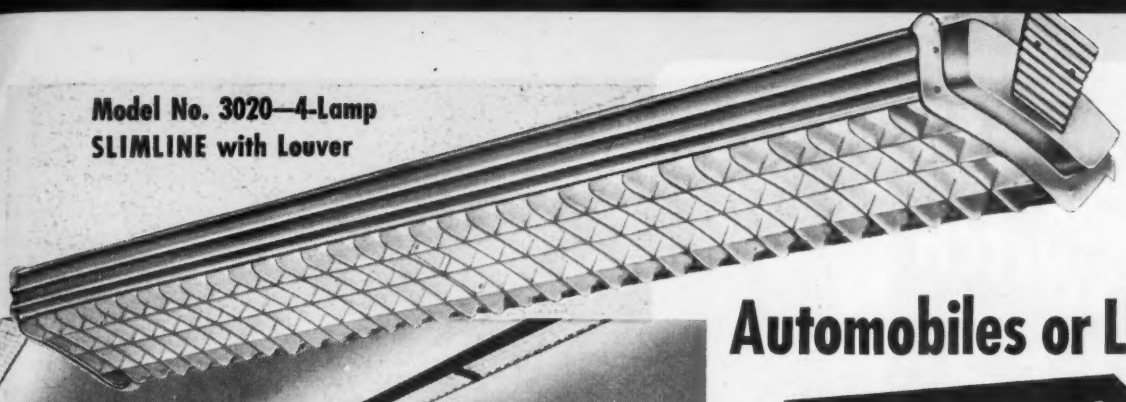
Working plane intensity now averages 42 footcandles—more than four times the old intensity with about 100 watts less per outlet. Illumination is more evenly diffused and of much better quality than the original.

Engineer Burton has attained a continuous-row effect with his long fixtures; simplified his wiring problem; estimates the weight of one unit to be about half that of four standard 4-foot units, an important factor in those areas where messenger cable suspension is used.

Lighting Makes The Difference

The most outstanding feature of the modernization plan, recently completed for the Covina National Bank, Covina, California, is the lighting. The banking area, measuring 37 by 58 feet with a 12-foot ceiling, is typical of many such institutions located in moderate sized towns across the country. The installation demonstrates that modernization need not be radically different from existing conditions to be effective. In the case of the Covina Bank, no major structural changes were incorporated in the revised plan, such details including only an acoustical tiled ceiling, new grills for bank tellers' windows, and the use of glass panelling at the rear of the banking space to replace the dark wood panels which formerly flanked the entrance to the vault area.

The lighting makes the difference. Initially, illumination was furnished by two rows of four 500-watt incandescent Duplexalites, utilizing 1.86 watts per sq. ft. Footcandle intensities ranged from 4 to 8 footcandles, or an average of 3.2 footcandles per watt per sq. ft. These eight units were replaced by 56 4-lamp Lumidor fixtures, mounted continuously in four surface-mounted rows. Footcandle intensities



Model No. 3020—4-Lamp SLIMLINE with Louver

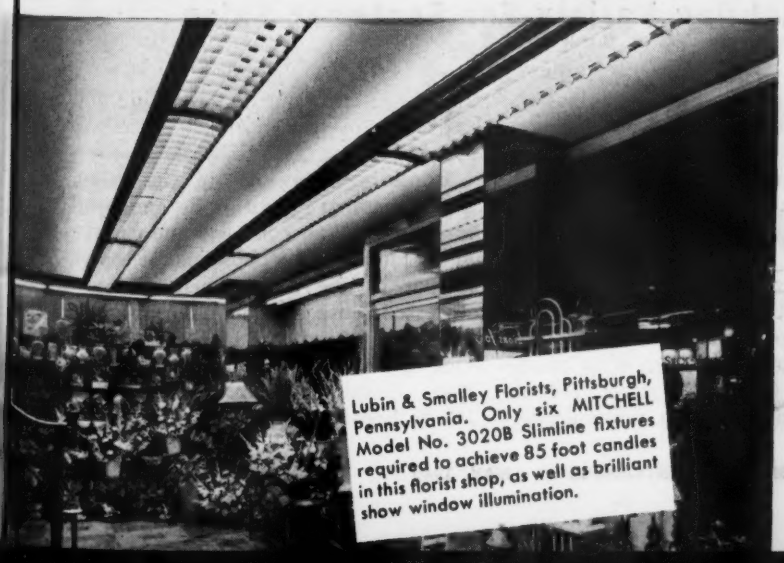
Automobiles or Lilacs...

MITCHELL

"SLIMLINE" Lights them All!

Clark Pontiac Company, Braddock, Pennsylvania. A modern automobile showroom completely lighted by MITCHELL Model No. 3020B Slimline fixtures to achieve an average lighting level of 50 foot candles.

Thames Rexall Drug Stores, Beaumont, Texas. An exceptional selling atmosphere created by the use of continuous row MITCHELL Model No. 3020B Slimline fixtures. Result: an average of 75 foot candles.



Lubin & Smalley Florists, Pittsburgh, Pennsylvania. Only six MITCHELL Model No. 3020B Slimline fixtures required to achieve 85 foot candles in this florist shop, as well as brilliant show window illumination.

Right across the country, businesses of *every kind* are turning to MITCHELL "Slimline" to get the "selling" light they need. It's uncanny how one installation sells another—in whole communities the commercial lighting swing is to MITCHELL "Slimline".

Progressive businessmen prefer this handsome, smooth, powerful lighting that creates a traffic-building sales-inviting atmosphere. They like the way MITCHELL "Slimline" puts appeal into merchandise, makes it more desirable and easier to sell—the way it produces *measurable* increases in sales and profits.

This user acceptance builds volume business for the wholesaler. MITCHELL "Slimline" installations are easy, smooth jobs for the contractor—time-saving profitable business. And utility men can recommend this superior lighting with confidence.

Whether it's automobiles or lilacs—MITCHELL "Slimline" lights *and sells* them all!

Write for complete descriptive literature covering MITCHELL Slimline fixtures. Ask for Bulletin No. 322 describing 4-Lamp units; Bulletin No. 339 describing 2-Lamp units; Bulletin No. 334 describing spotlight units. for use with Slimline fixtures.

MITCHELL

First Choice in Lighting

Mitchell Manufacturing Company

2525 Clybourn Avenue • Chicago 18, Illinois

In Canada: Mitchell Manufacturing Company, Ltd., Toronto, Canada

You can INCREASE YOUR TIME SWITCH SALES NOW

WRITE FOR
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"Plan for more Sales" including full information on the INTER-MATIC Time Switch.
DO IT TODAY

SELL THE

INTER-MATIC

for AUTOMATIC CONTROL of lighting, heating systems, fans, pumps, motors and many other types of installations in—

- STORES
- HOMES
- APARTMENT BUILDINGS
- FARMS
- FACTORIES
- CHURCHES

Hundreds of electrical contractors throughout the country are already carrying out our suggested "PLAN FOR MORE SALES". Their orders prove that the plan can help you increase your own sales!

ONLY
$10.95
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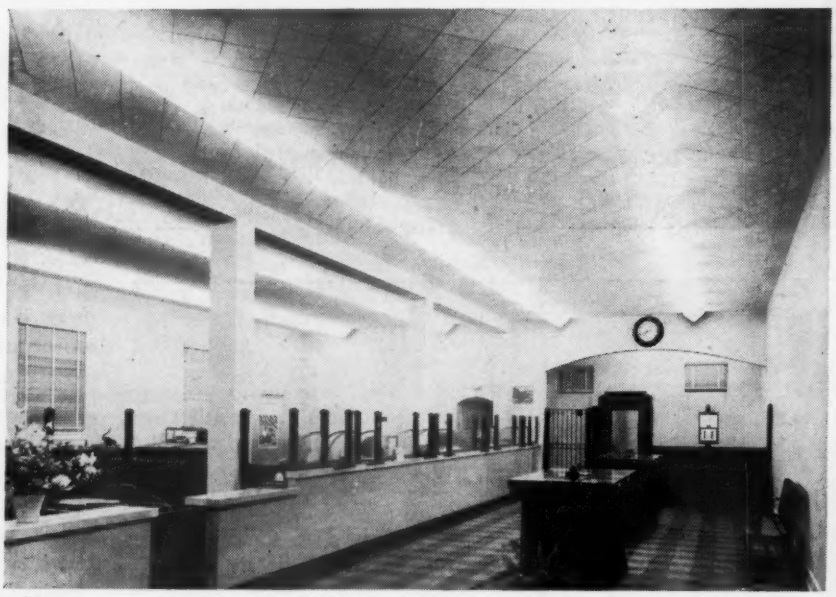
F.O.B. Factory Chicago

International Register Co.
2624 W. Washington Blvd.
Dept. 59-B, Chicago 12, Ill.

INTER-MATIC
TIME SWITCH

Eight 500-watt Duplexalites, pendant mounted, created an uneven lighting coverage which varied from 4 to 8 footcandles.



Four rows of Lumidor 4-lamp fluorescent fixtures, mounted end to end, result in an even spread of high-intensity diffuse lighting.

now range from 70 to 78 with a consumption of 5.4 watts per sq. ft. This indicates an increase of 4.5 times in the illumination with a corresponding increase in wattage of 2.8 times. Whereas the initial lighting pattern was spotty in appearance and subject to lighting variations of 100 percent, the present installation provides even, glareless, diffuse lighting which is uniform in intensity and productive of greater eye comfort and teller accuracy.

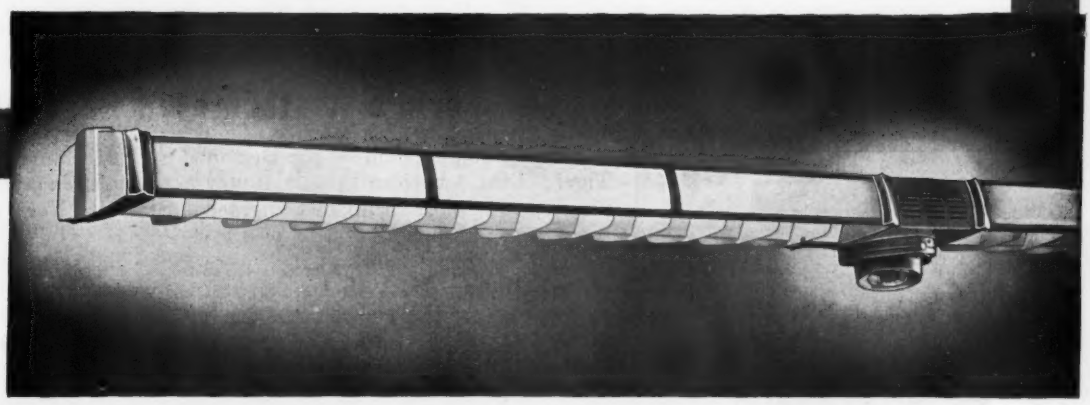
Lighting Variety For Footwear Salon

Barclay's Shoe Store, Boston, Massachusetts, utilizes several lighting sources to present their line of footwear and accessories to the best advantage. In the swank setting designed by architect Archie Riskin, rich fabrics, carpeting, serrated panelling and special display niches are illuminated by fluorescent and incandescent lamps, positioned for indirect as well as direct lighting. With an all-glass front facing the street, the interior design becomes a full-scale display area, attracting the attention and patronage of pedestrians and passing motorists.

Bordering one wall of the salon, fluorescent cove lighting is employed to reduce ceiling contrasts and to provide coolness to the general color temper of the incandescent sources. Recessed lensed floodlamps punctuate the clean area of the ceiling and provide general high-intensity illumination. Suspended spun-metal streamlined housings direct spot beams

These are the Wakefield "Grenadier Spots" for double-duty store lighting...

In any installation where "spot" lighting and general lighting are desirable, you can recommend the Wakefield Grenadier "Spots" to do the double job with complete confidence. To all the proved advantages of the regular Grenadier has been added the plus advantage of an excellently designed spotlight assembly. Wakefield Grenadiers are finely engineered louvered units with translucent white plastic side panels. All metal parts are beautifully finished in soft metallic satin. For complete details on Grenadiers and the entire Wakefield line, you should have our fully illustrated, factually written, 36-page catalog. Write for your copy today.



THE GRENADIER II "SPOT"

Takes two 40W fluorescent lamps in each 4′ section. Each 4′ section has a single adjustable "spot" taking a 150W Sealed-Beam lamp.

THE GRENADIER IV "SPOT"

Takes four 40 W fluorescent lamps in each 4′ section. Each 4′ section has two adjustable "spots", each taking a 150 W Sealed-Beam lamp.

Wakefield Over-ALL Lighting

FOR OFFICE • DRAFTING ROOM • STORE AND SCHOOL

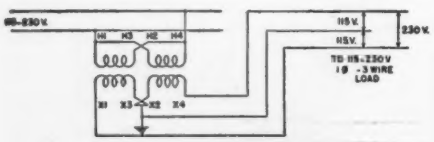
DES. PAT. 148, 191

THE STAR — THE GRENADIER IV — THE COMMODORE — THE DIPLOMAT

WAKEFIELD

HOW TO PROVIDE A 3 WIRE 115/230 VOLT CIRCUIT FROM A 2-WIRE PRIMARY

No need to rewire a job when you need a 3-wire 115/230 volt circuit. Simply connect an Acme Electric air cooled power transformer to the 2-wire primary at the most convenient location and you're all set for 3-wire 115/230 volt service.



Acme Electric air cooled transformers are available for immediate delivery in capacities from 1/10 KVA to 50 KVA in all standard primary voltage ratings up to 2400 volts. Write for Bulletin.

ACME ELECTRIC CORP.

365 Water St. Cuba, New York

Manufacturers of Transformers for Fluorescent lighting, radio and television, neon signs, electronic devices and rectifiers.

Acme Electric TRANSFORMERS

Fluorescent cove lighting and concealed wall-niche strips, combined with incandescent lensed units, set ceiling flush, and spotlights in spun-metal housings, create variety and interest in the women's footware salon of Barclay's, Boston, Shoe Store.

towards boxlike display cases along one wall, while fluorescent strips top-light framed niches at the opposite side of the sales area.

With architectural and furniture designs following the same modern trends as the lighting, the atmosphere is one of progressive enterprise.

World's Best Lighted Baseball Field

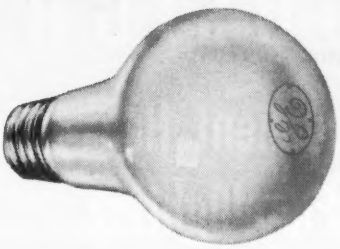
Briggs Stadium, home of the Detroit Tigers of the American League, is now the world's most brilliantly lighted baseball park. Its installation of 1386 General Electric floodlights were turned on June 15, 1948 for the first major league night game in the city's history.

More than 200 footcandles of illumination are provided over the playing area by 58 G. E. Type L-83 1000-watt floodlights and 1328 G. E. Type L-69 1500-watt floodlights. This illumination is equivalent to 82,000,000 candlepower, or the light from 24,000 100-watt reading lamps.

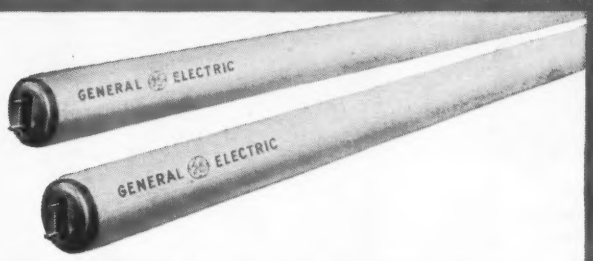
The installation at Briggs Stadium is similar in layout with that at Yankee Stadium, New York (*Electrical Contracting*, July, 1946) containing 1245 floodlights on six steel towers, and at Fenway Park, Boston, (*E. C. & M.*, November, 1947) containing 1120 floodlights on seven steel towers. All floodlights were focussed after installation according to prearranged charts prepared in the G. E. Illuminating Laboratory at Schenectady, N. Y. Each of these three G. E. floodlight-equipped baseball parks has nearly twice the illumination of any other playing fields in the U. S.

How to make a "no man" say "yes"

EVEN if your prospect isn't in a buying mood, here's how to keep from going away empty-handed. Remind him that you handle General Electric lamps and make sure he has plenty on hand. Every customer you call on needs lamp bulbs. And since G-E lamps are tops in preference, it often only takes a suggestion from you to clinch a sale.

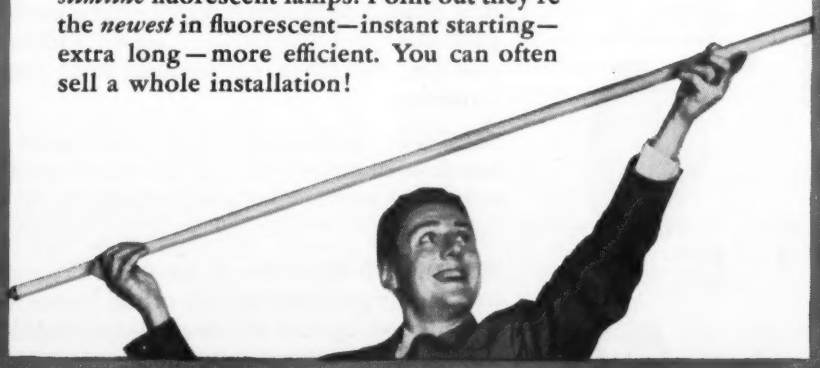


JUST ABOUT EVERYONE uses incandescent lamps somewhere in his plant or office. G-E makes all types and wattages for every requirement.



THE REPLACEMENT MARKET for fluorescent lamps is getting bigger every day. Help your customers get all the light they pay for by reminding them to replace worn-out tubes with new General Electric fluorescents.

MORE AND MORE places being lighted by G-E *slimline* fluorescent lamps! Point out they're the *newest* in fluorescent—instant starting—extra long—more efficient. You can often sell a whole installation!

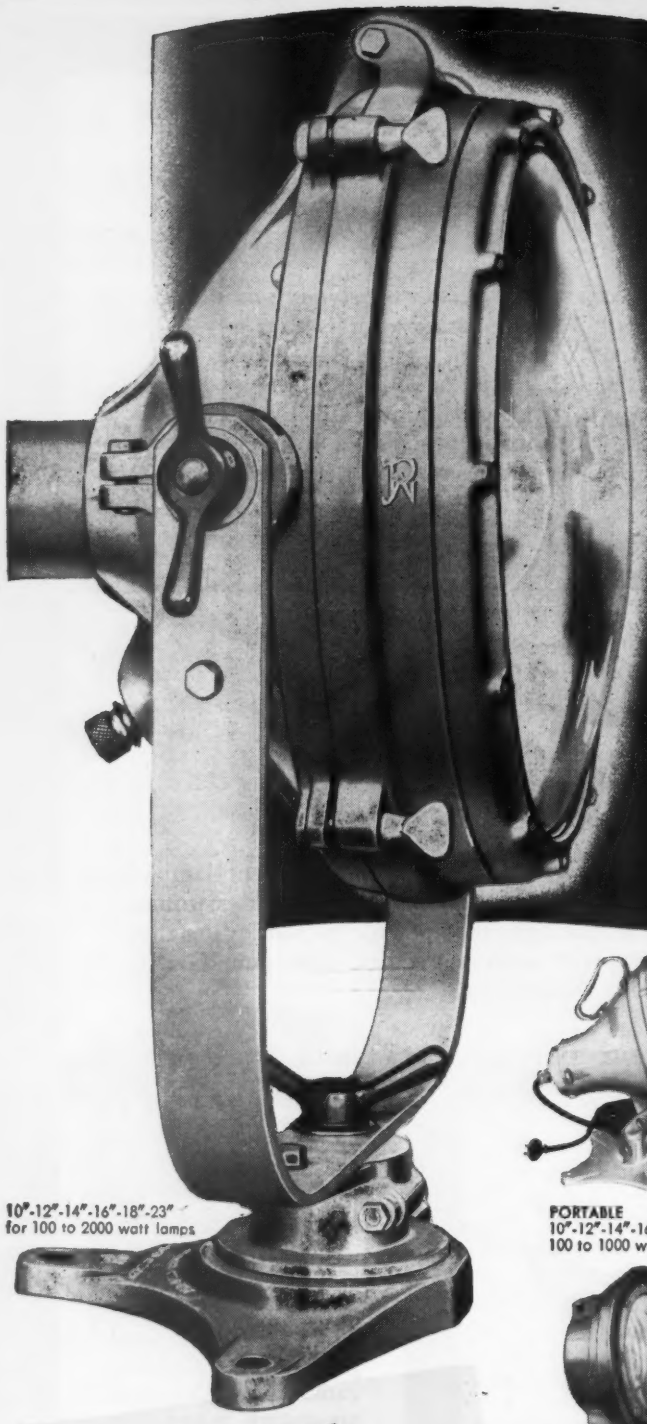


AND DON'T FORGET G-E miniature lamps! They can add up to a good-sized order because they're used in so many ways—in elevators, indicators, instruments — hundreds of other places.

G-E LAMPS

GENERAL ELECTRIC

EVERYBODY USES LAMPS...
THE EASIEST TO SELL ARE



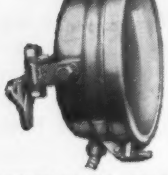
10"-12"-14"-16"-18"-23"
for 100 to 2000 watt lamps

Specify— PYLE-NATIONAL FLOODLIGHTS

for Permanent Heavy-Duty Floodlighting

PORTABLE
10"-12"-14"-16"
100 to 1000 watts

FLUSH—10" for Pit or Subway Wall or Ceiling
100-150-200 watts



SHORT RANGE—10"-12"
for Wall Mounting
100-150-200 watts

Dependable Floodlighting with Minimum Maintenance

Pyle-National floodlight equipment is designed and constructed to withstand the most severe operating conditions. Complete range of types and sizes are available.

RUGGED cast aluminum housings with tight sealing doors and door glass joints—positively dust proof and moisture proof—give maximum protection to reflectors and lamps and reduce cleaning and other maintenance to an absolute minimum.

STRONG, galvanized cast iron bases and brackets of many types are provided for simple mounting and accurate adjustment in all locations.

ADVANCED DESIGN of the carefully molded and highly polished reflectors and lenses insure the highest optical efficiency—thoroughly annealed for maximum toughness.

Write for catalog 2100 giving complete information.

The services of our trained and experienced floodlighting specialists are available at all times to advise and assist in installation problems.

SINCE 1897

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1344 NORTH KOSTNER AVENUE, CHICAGO 51, ILLINOIS

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In the News

International Lighting Exposition—Conference

Sponsored by the Industrial and Commercial Lighting Equipment Section of the National Electrical Manufacturers Association, the 3rd International Lighting Exposition and Conferences was held in Chicago, March 29-April 1, 1949, in the Hotel Stevens. Attended by nearly 7000 illuminating engineers representing all branches of the lighting industry, and by architects, designers, consulting electrical engineers, educators, electrical contractors, wholesalers and utility engineers, plant engineers and others, the Show was a mecca for everyone having any interest in this two billion dollar industry.

Theme for the Exposition and Conference was "New Light on Planned Lighting". Introduced for the first time less than three years ago, *Planned Lighting* has been accepted industry-wide, and is now in full swing. This was ably demonstrated in all activities comprising the four-day Show.

Outstanding attractions of the Show were the announcement of winners and presentation of the Gold Seal Awards in the Merit Award Competition, display of all winning Merit Award entries, exhibition of the latest designs and developments in lighting equipment, light sources and lighting accessories, a four-day program of conferences on timely lighting subjects, and an evening of entertainment for all visitors, sponsored by the Exhibitors.

Conference Sessions: G. T. Morrow, chairman of the Exposition Operating Committee, officially opened the Exposition and Conferences on Tuesday morning, March 29, with a short address on "Y B in Dark—Get New Light on Planned Lighting".

Serving as chairman of the opening conference session, Lee E. Tayler, president, Illuminating Engineering Society, stressed the importance of dissemination of more and better information on lighting, if we are to get the most out of the Planned Lighting program.

B. W. Clark, NEMA president, and vice-president of Westinghouse Electric Corporation, in his welcoming address said that "Lighting has developed into a $2 billion business during 1948, and it will go higher as America becomes even more light conscious. Lighting is practically a depression-proof business", he concluded.

South Dakota electrical contractors attending NCEI convention in Minneapolis include: (L to R) Allen Harmes, Mitchell; A. E. Nelson, Labolt; O. R. Thompson, Veblen; E. M. Lothrop, Huron, secretary-treasurer, South Dakota Electrical Contractors Association; G. H. Palmer, Madison, S. D.; and visitor Arthur Siegal, Selo Electric Co., Seattle, Washington.

D. M. Salsbury, vice-president of the National Electrical Wholesalers Association and president, Westinghouse Electric Supply Company, spoke on "The Wholesaler's Part in Lighting Sales". He stressed the value of planning. "Plan the job, then plan the sale", he advised. "By planning the lighting jobs, five times more lighting sales can be realized, with still more plus sales of wiring and wiring devices", he pointed out.

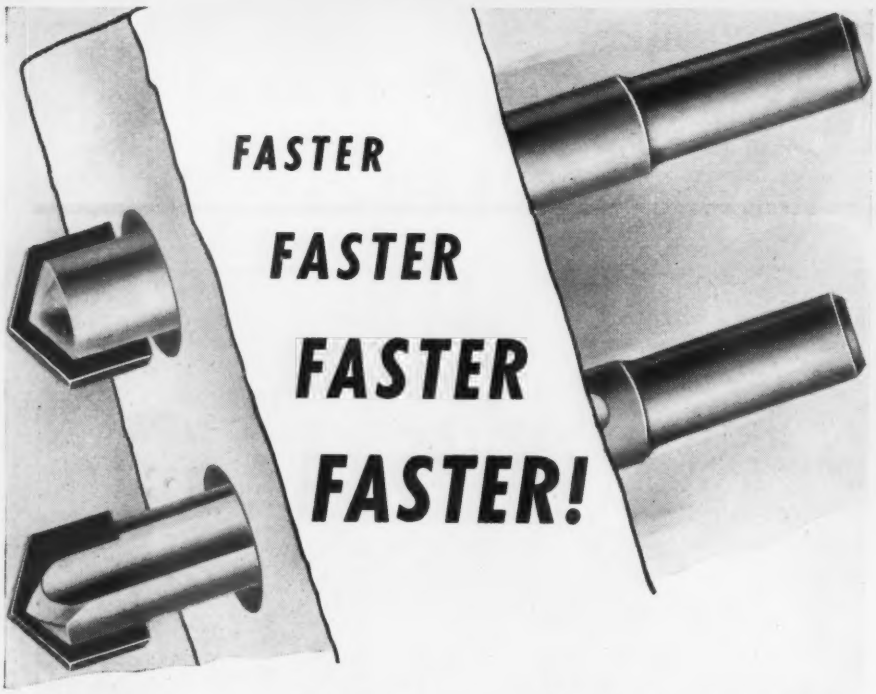
Eric Johnston, president of the Motion Picture Association of America, Inc., and past president of the United States Chamber of Commerce, speaking on general business conditions, proposed a government agency to insure extraordinary risks involved in private investments abroad, which would operate on an actuarial basis.

Explaining that America always does the most business with highly industrialized nations, Mr. Johnston declared that the purchasing power of foreign countries must be raised.

American businessmen have three principal fears which prevent any appreciable private investment abroad at this time, he said. Two of these, risks of nationalization, confiscation or war, and fear that foreign earnings will not be convertible into dollars, would be covered by such a government agency as he proposed. The third, fear of foreign government restrictions on management, should be overcome through State Department and private industry cooperation with foreign governments in the removal of such restrictions, he said.

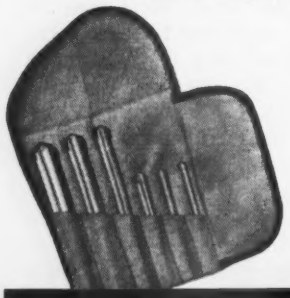
Speaking of the benefits of the great American capitalistic system he said "I have seen all the different government systems and I can tell you there is nothing better than our American system. It is far from perfect. We must constantly improve it, increase its advantages and make them available to more people in our own country and elsewhere. Then we may be able to achieve Peace on Earth and Good Will Toward All Men".

Alston Rodgers, senior lighting engineer for General Electric Company at Nela Park, Cleveland, Ohio gave a new presentation and demonstration on the subject of "What the Lighting of the Future Will Mean to You". Advancements have been made not only in lamps, but also in fixtures, materials, products and applications, he told the visitors. These include two new fluorescent lamp colors, the soft white and warm tint; use of slimline fluorescent lamps in buses; application of large reconnaissance photography flashtubes to the lighting of photo studios for lighting large sets; two new types of louvers—one all-glass with louvers "photographed" in, the other cardboard, which is thrown away and replaced with new louvers when the old ones are worn out or dirty; a special Mars railway signal light to be used for safety; two new reflector lamps—a 25-



NOW... DRILL MASONRY UP TO 4 TIMES FASTER!

- Two styles (fluted or round shank) for deep or shallow holes
- Wide range of sizes
- Carboloy Cemented Carbide tips drill any masonry
- Drills stay sharp up to 50 times longer
- Fit any standard rotary drill press, or hand brace
- Drill clean, accurate holes . . . quietly
- Available singly or in 3 handy kits of six assorted sizes each



No wonder these rotary drills work so fast, stand up so long. The tips are made of Carboloy Cemented Carbide—the hardest metal made by man!

Send the coupon for more information about these time- and money-saving drills, and about the three handy assortments.

CARBOLOY®
CEMENTED CARBIDE
MASONRY DRILLS

CARBOLOY CO., INC., 11175 E. 8 Mile Blvd.
Detroit 32, Michigan

Gentlemen:

Please send me free Folder SA 236, containing prices and specifications on Carboloy Masonry Drills.

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ADDRESS_____

CITY_____ ZONE_____ STATE_____

Montana contractor H. F. Schulz (left), Schulz Electric Service, Miles City, Montana; and his "neighbor" Chester Brown, Dickinson, N. D., electrical contractor, are annual visitors to the all-industry conferences held in Minnesota's Twin-Cities.

watt PAR-38 low voltage lamp for lighting railway coach steps, and a 75-watt similar type standard voltage reflector lamp for lighting the dining room table. Many of these new light source developments were also on display in the Exhibit Hall.

In discussing "How Atomic Power Will Affect the Future of Lighting", Ward F. Davidson, research engineer for Consolidated Edison Company of New York, Inc. quickly disposed of the possibility of using atomic energy directly to operate new self-luminous light sources, due to the extreme hazard involved with such intense non-luminous radiation as would exist.

Use of atomic energy for electric power generation, which in turn can be converted into light, holds considerable

Inspecting triple pole switch at Milwaukee EME Show are William Fay, Arrow-Hart Hegeman Electric Co., Inc., Chicago; and P. Stephany (right), assistant to plant engineer, National Enamel and Stamp Co., Milwaukee.

promise, Mr. Davidson indicated. "Taking a quick average and adding it all up, we are led to an overall cost for the power plant of some two or three times that of a coal burning station. The cost of nuclear fuel at present would be prohibitively high in comparison with coal for general power production, but there is a slight chance that it may someday become comparable or even more favorable", he said.

Robert W. McChesney, president, National Electrical Contractors Association talked on "The Contractor's Part in Lighting Sales". "Customers protest inadequate lighting and inadequate wiring, but have never been known to complain that the lighting was too good, or that the wiring was too adequate", McChesney stated. "Nearly everyone in the interdependent electrical industry deserves some

F. M. "Jerry" Trip (left), newly elected president of the Midwest Electrical Council, Minneapolis, confers with Arthur Siegel (center), vice-president, Electrical Contractors Society of Washington, Seattle, Washington; and Arthur Clausen, business manager of the Minneapolis and St. Paul Electrical Contractors Associations at recent all-industry convention in Minneapolis.

censure for inadequate lighting jobs sold", he stated, "but the electrical contractor gets most of the blame. He is the closest to the customer, on the firing line where there is no one to pass the buck to".

Placing the electrical contractor in the role of "the key man in lighting", McChesney outlined the conditions that make for inadequate lighting jobs. These include the lack of a plan, the practice of selling lighting fixtures instead of selling a lighting result, inferior materials and equipment (fortunately a declining cause), improper installation, lack of qualified lighting contractor organizations, and direct selling to customers at contractor

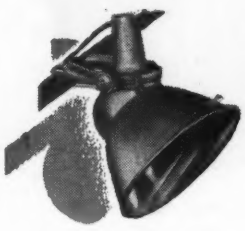
Sportslighting . . . an Opportunity for Contractors

This is Witter Field of Piedmont high school, California. Installed by Abbet Electric of Oakland, it is another example of the increasing number of floodlighting jobs worth going after.

Installation was simple—planned, ordered and executed as a standard G.E. "144" lighting system—according to "the book."

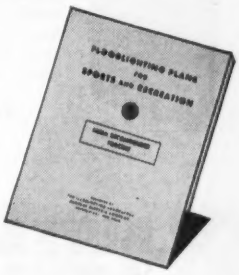
This book specifies everything to assure a perfect lighting job—from the exact location of the six 80-foot steel poles to the aiming of the 144 L-69 floodlights.

Floodlighting installations like this are going in all over the country—in ever increasing numbers. There are seventeen others at high schools near Piedmont—all recently installed, and using G-E floodlights. Municipalities and industrial plants, as well as schools, are all prime markets. Installations can be handled by any competent contractor, even without previous lighting experience. They should yield a satisfactory profit—and frequently they carry, with the initial installation, a year-after-year maintenance contract. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*



FREE PLANS AVAILABLE—This is "the book" that contains 38 complete floodlighting plans for sports and recreation. One is the "144" lighting system used at Witter Field—144 G-E floodlights on 6 80-foot steel poles—complete with a list of all material required down to concrete and paint. Among other plans are tennis courts, volley ball and 12- to 48-lamp softball fields. Ask for it as GET-1284.

THE SPORTS-LIGHT—This is the floodlight used at Witter Field—G.E.'s L-69. It gives more light per unit, more light per watt, is easier to install and cheaper to maintain than any other comparable unit. It's so good that four major-league parks use it, so economical that it's the favorite for sandlot softball. Bulletin GEA-4835 gives complete description and prices.

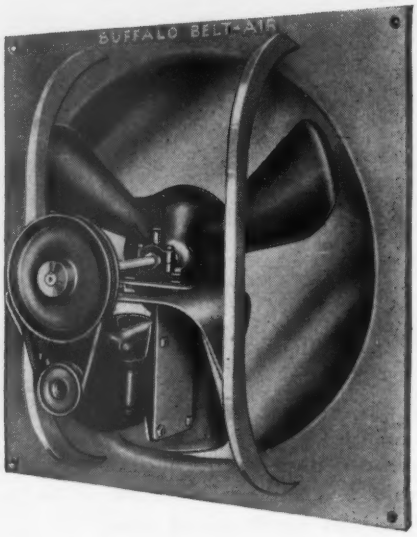


GENERAL ELECTRIC

451-135

CHECK OFF THE ADVANTAGES

EASY TO INSTALL
SIMPLE TO SERVICE
RUGGED--DURABLE
4,400 TO 19,000 CFM



IT PAYS TO INSTALL "Buffalo" FANS!

The Belt-Air is a real "customer-satisfier"! To begin with, it's a good, husky fan. The sturdy frame, motor bracket, bracket arms and blades are shaped to move the most air on the least power. Motors are high grade, of standard make. The square flanged panel with pressed knockouts makes your installation job simpler. And you can choose from five sizes, 24" to 48". (For smaller volume requirements, use the popular "BREEZO" Fan.) WRITE FOR BULLETIN 3222-F for the facts on these and other "Buffalo" Fans that mean good profits for you and satisfaction for your customers.

for Commercial and Industrial Ventilation
"Buffalo" fans
BUFFALO FORGE COMPANY, Buffalo, N. Y.
CANADIAN BLOWER & FORGE COMPANY, Ltd., Kitchener, Ont.

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PANEL BREEZO FANS BELTED VENT SETS BELT-AIR FANS
BREEZ-AIR ATTIC FANS "L" BREEZO FANS "NV" BREEZO FANS

Interested in the gun type insert tool are H. G. Drews, Chain Belt Co., Milwaukee and R. I. Boyle, Standard Electric Supply, Milwaukee. Bob Baumann, Stemco Corp., Chicago, demonstrates the unit at the recent Milwaukee EME Show.

prices by wholesalers and manufacturers.

Julian Elsworth Garnsey, colorist, gave a spirited talk on "A Little Light on Color", outlining what color is, how it affects human vision, and how it forms part of the lighting problem of the illuminating engineer.

Exhibits: More than 75 exhibitors displayed and demonstrated both their popular production-line items and their newest developments in light sources, lighting equipment, and lighting accessories and parts.

Some lighting trends were reflected by the exhibits and displays. These trends are apparent when the exhibits of this Exposition are compared with the exhibits of the last Exposition held eighteen months ago.

Foremost among these trends are

Checking on material supply situation during recent electrical industry conference in Minneapolis are: (L to R) A. R. Undlin, Minnesota Electrical Supply Co., Willmar, Minn.; Arnold Larson and Wilbert Kalpin, Larson Hardware and Electric, Parkers Prairie, Minnesota.

louverall ceilings. These have become an influential lighting technique, and an ever increasing number of the installations made in the months ahead are expected to involve either complete ceilings or partial ceiling treatments. Louvers are now available for louverall ceilings and luminaires in a variety of materials, including plastics, metal, paper, and now glass. Corning Glass Co. announced their "Fota-lite", a new photosensitive glass louver panel.

Recessed troffers are still popular, and are generally recommended by their producers for use in offices, drafting rooms and school classrooms. They are available equipped with glass or plastic diffusing covers, prismatic glass lenses, and louvers of various sizes, shapes, patterns and shielding angles. Among new developments in this field were two new prismatic glass "no glare" lenses announced and exhibited by the Holophane Company.

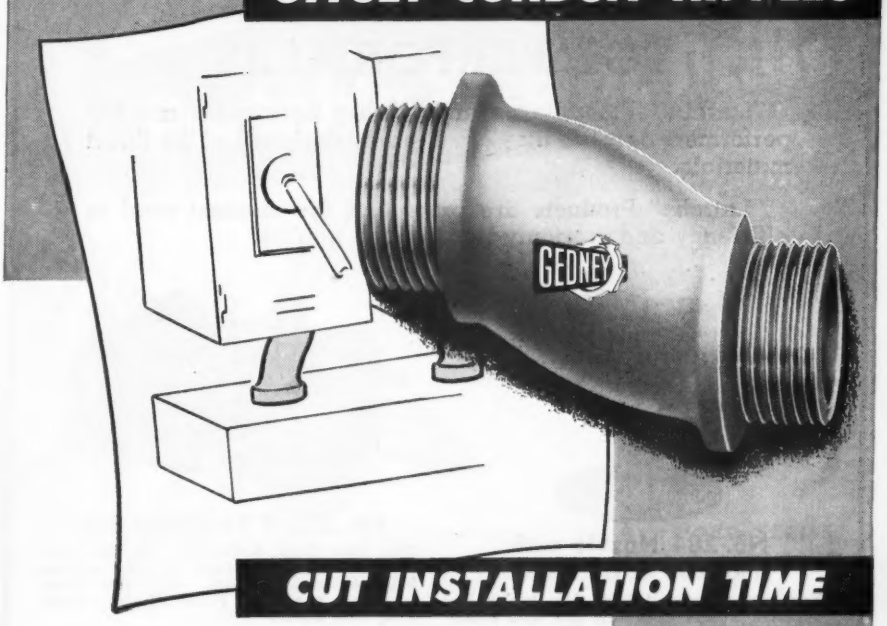
Lighting consultant J. L. Stair (right) receives a Certificate of Member Emeritus of the Illuminating Engineering Society from Glenn G. Boyd, Chairman of the Chicago Section. Until his retirement last year, Mr. Stair was a consulting engineer with Curtis Lighting, Inc., Chicago; is a Fellow of I.E.S. (1945); and was president of I.E.S. from 1933 to 1934.

Manufacturers of lighting equipment generally are making greater use of plastics and glass in luminaires. Nearly all manufacturers of commercial luminaires displayed one or more units having luminous plastic or glass side panels, generally of low brightness. Some designs were also shown using perforated metal sides, or louvered metal sides which shield the light sources and at the same time reflect light on the exterior surface of the opaque shields to reduce brightness contrast. One manufacturer, the Holdenline Company, featured an industrial reflector with removable plastic side reflector shields, while another manufacturer, Pittsburgh Reflector Company, displayed a new commercial unit, the "Monroe", with removable side re-

GEDNEY

MALLEABLE IRON

OFFSET CONDUIT NIPPLES

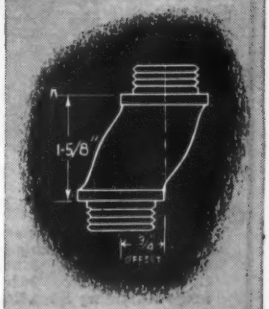


CUT INSTALLATION TIME

PERMIT BOX ALIGNMENT

Here are the fittings you have so often needed to simplify the job of box alignment. They are not only easier and faster to use but also make neater and better installations where box knockouts do not line up. Use GEDNEY Malleable Iron Offset Nipples when distribution boxes, cabinets, pull boxes, switch enclosures, etc., are ganged together and you will be able to line them up in perfect order. Then, too, when conduit stubs emerging from concrete are out of alignment, a GEDNEY Offset Nipple will often straighten out the job.

Send for samples and prices on these tough Malleable Iron GEDNEY Fittings — the only Fittings rustproofed and time protected by GED-O-LITE finish.



GEDNEY MALLEABLE IRON OFFSET CONDUIT NIPPLES Are furnished in six sizes — ½", ¾" 1", 1¼", 1½", and 2". All sizes have a ¾" offset and 1⅝" distance between shoulders for uniform spacing.

GEDNEY ELECTRIC CO.

GENERAL OFFICES: RKO BLDG., RADIO CITY, NEW YORK 20, N. Y.

FOUNDRY, FACTORY AND SHIPPING POINT • TERRYVILLE, CONN.

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FLOOR BOXES ★ WIRING SPECIALTIES

FULLMAN MANUFACTURING CO. QUALITY AT LATROBE OB SUPREMACY LATROBE, PA.

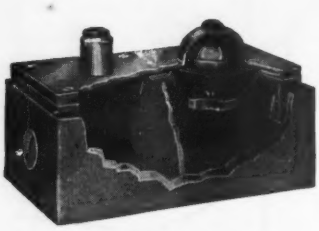
TOP PERFORMERS

"Latrobe" Floor Boxes and Wiring Specialties are top performers because they are expertly designed of the finest materials.

"Latrobe" Products are proof that the shortest road to efficiency and economy lies through quality.

No. 284 Nozzle with No. 200 Cover Plate

Neat and compact fitting, this Duplex Receptacle Nozzle does fine job with either ½" or ¾" brass pipe extension.



No. 252-R Two Gang Box

This Two Gang Adjustable Box has our own No. 208 Receptacle in one section. Has minimum of parts. ½" Flush Brass Plug with one Cover Plate; 2" Flush Brass Plug with other.

No. 150 Box— No. 207 Nozzle

Adjustable and watertight, the No. 150 Box gives dependable service in concrete or wood-finished concrete floors. 4¼" Cover Plate No. 242 and large Adjusting Ring No. 215.

No. 110 "Latrobe" Watertight Box

The No. 110 "Latrobe" Box has a compact, simple design that assures speedy installation and smooth service. Cover Plate is 3½" diam. 208 Receptacle.

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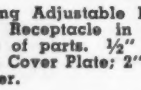
"Bull Dog" BX Cable Staples

"Bull Dog" high quality staples are preferred in every section of the country. Order by carton, keg or barrel: 2500, 6000, 30000.



"Bull Dog" Insulator Support

"Bull Dog" Supports come in 4 sizes from 1" to 2½". Their sure grip makes them completely reliable for fastening porcelain or glass insulators to exposed steel framework.

FULLMAN MANUFACTURING CO.
LATROBE . . . PENNSYLVANIA

flector shields in either aluminum, plastic or steel. Curtis Lighting, Inc., announced their new unit, the "Store-Liter", which uses side panels of extruded polystyrene, designed to provide high illumination on vertical surfaces.

Among other general luminaire developments were eight-foot long two- and four-lamp industrial and commercial units, both for standard slimline and the new T-12 slimline 96-inch lamps. Nearly all fixture designs shown for fluorescent lamps were of simple clean-line design and provided for installing either singly or in continuous row. One manufacturer, the Frink Corporation, featured an eight-foot long four-lamp custom design luminaire, consisting of special decorative glass bottom with simple period ornamentation. Sylvania Electric exhibited a new low-cost industrial reflector unit known as the "Economy" model, and Benjamin Electric Mfg. Company displayed a complete new line of reflector strips for both standard and slimline fluorescent lamps, designed for use with louverall lighting systems.

Two new hospital bed lamps were exhibited, one by Fostoria, and the other by Luminous Equipment Company. Each is fully adjustable with the complete reflector assembly easily removable for handy use as an examination lamp.

Other miscellaneous new developments on display included an outdoor "pylon-lite" standard, using 40-watt fluorescent lamps, by Revere Electric; a bidirectional high intensity airport runway light by Westinghouse; a safety switch for cold cathode series lighting by Jefferson Electric; and a new 200 ma., 93-inch cold cathode lamp by Colonial Electric Products.

Construction details of new retractable cord reel are shown to Ben G. Sayles (right), chief electrician, D. J. Murray Mfg. Co., Wausau, Wis., by Ray Smith of the Daniel Woodhead Co., Chicago, at recent Milwaukee EME electrical equipment exposition.

Rural wiring problems occupy leisure time of (L to R) Arthur Oksendahl, Rugby Electric Co., Rugby, N. D.; J. A. Warkentin, State Board of Electricity, Mountain Lake, Minn.; and Lloyd Peterson, P & S Electric Service, New Richland, Minn., at recent electrical industry convention in Minneapolis.

Reflector housings for both fixed and adjustable mounting, for use with reflector spot and reflector flood lamps, complete with detachable louvers and color devices were exhibited by Swivelier, General Lighting and others.

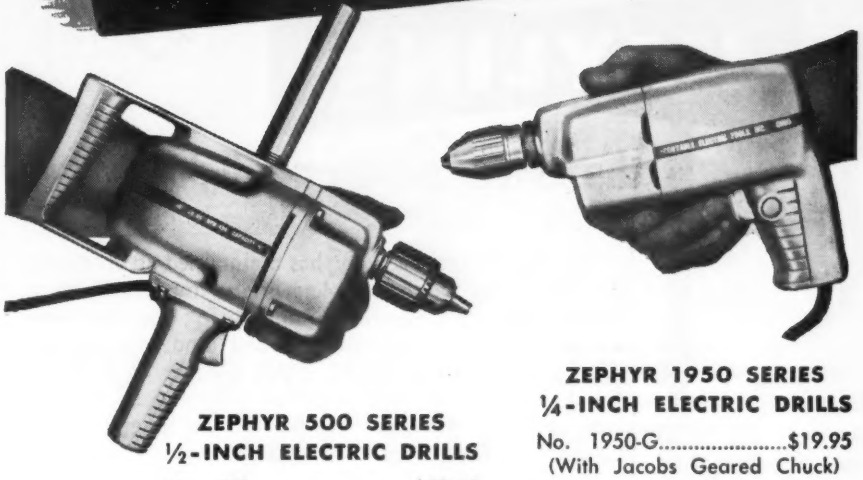
Considerable progress was noted in all new equipment design with respect to simplified maintenance and installation features. Such features are now mandatory from a competitive standpoint on all types of equipment, and constitute some of the major factors used as sales points on practically every lighting installation sold.

Some of the new light sources on exhibit included the 75-watt T-12 fluorescent slimline, the new Deluxe white finish 100-watt incandescent and 150-watt indirect-lite lamps, the new small size A-19 bulb 75-watt lamp, and 60-watt and 100-watt yellow enameled "glass on glass" lamps for outdoor lighting. In addition to these new standard lamp developments, displayed by the major lamp manufacturers, Solar Electric Corporation displayed several 20-watt and 40-watt fluorescent lamps with a decorative motif worked into the phosphors of the lamps, and a new fluorescent lamp incorporating within the glass tube of the lamp itself a special resistance which eliminates the need for an external ballast.

Merit Awards: Judges in the Merit Award Competition announced the names of 220 winners of Gold Seal, Merit with Distinction and Merit Awards. R. D. Bradley, chairman of the Merit Award Competition Committee made the presentation of the 14 Gold Seal $100 Awards at the opening conference session. These consisted of three Awards in the utility

Presenting the New ZEPHYR Line

Portable Electric Drills



ZEPHYR 500 SERIES
½-INCH ELECTRIC DRILLS

No. 500.....$29.65
(With Jacobs Hex Chuck)

No. 510.....$34.65
(With Jacobs Geared Chuck)

ZEPHYR 1950 SERIES
¼-INCH ELECTRIC DRILLS

No. 1950-G.....$19.95
(With Jacobs Geared Chuck)

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YOUR BEST BET...EITHER ONE OR BOTH

These drills are the latest in proved, streamline design. In its capacity range, each represents a big advancement in the combination of high power, quality and refinement in construction, and long-life performance. Due to the shape, size, and light weight, each offers a new handling ease and convenience that readily appeal to the user. They are your best bet for maintenance, production, and utility drilling operations.

See your supplier for complete information.

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Fractional HP Motors • Electric Drills • Polishers • Saws • Sanders • Spin-A-Brush • Spraymaster

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New Light
Old Name
KAYLINE
the one source lighting line
For over 55 years Kayline has maintained an outstanding reputation for its complete line of modern lighting fixtures. The new Slimline fixtures bring you the latest advances in fluorescent lighting. These modern up-to-the-minute units come in three styles and are designed to fulfill every Slimline lighting need. They may be used for individual or continuous installations, and are engineered to give easier, lower cost maintenance.
In addition to the units pictured, Kayline Slimline is available in Channelite. For details on Slimline lighting, send for a Kayline Catalog Supplement.
Kayline Catalogs cover our three fields — commercial, residential, industrial. They are designed to help you sell more and better light. Send for one or all of them today!
For over 55 years
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2480 EAST 22nd STREET
CLEVELAND 15, OHIO

Hi-line contractors J. E. Bryant (left), Magnolia Construction Co., Memphis, Tenn.; and Paul Nehring, Jr., Nehring Electric Works, De Kalb, Ill., review rural line construction activity in their respective areas at RECA's recent Chicago convention.

lighting and power representatives classification, three in the electrical contractors classification, three in the architects and consulting engineers classification, three in the owners and users classification, and two in the wholesalers lighting specialists classification.

Electrical contractors winning Gold Seal Awards were: Kvalsten Electric Co., Minneapolis, Minn.; John Christianson Electric Co., Minneapolis, Minn.; and Hudson-Morgan Electric Co., Inc., Lynchburg, Va. (See pages 80-82 for details of lighting jobs winning these Awards).

Electrical contractors also won Awards on nineteen other entries in the Competition, representing a wide range of lighting installations including stores, offices, restaurants, banks, drafting rooms, a beauty shop, industrial plant, classroom and auto showroom.

Other Gold Seal Award winners were: *utility lighting and power representatives*—Eugene M. Fahey and J. A. Heffernan, Public Service Electric & Gas Co., Newark, N. J., on an electrician's shop; Walter E. Turnbull, Public Service Electric & Gas Co., Plainfield, N. J., on a high school classroom; and Burdette E. Sanderson, Public Service Co. of No. Illinois, Joliet, Ill., on a bank; *architects and consulting engineers*—J. L. Phillips, Birmingham, Ala., on a bank; Ernest C. Hinck, Jr., Montclair, N. J., on an office; and Paul E. Keyes, Duquesne Light Co., Pittsburgh, Pa., on a jewelry store; *owners and users*—Robert S. Hoffman, Perfection Stove Co., Cleveland, Ohio, on an industrial plant; H. W. Horn and C. E. Oswald, Dept. of Elec. Eng'g,

University of Illinois, Urbana, Ill., on an electrical engineering mechanical laboratory; and George H. Seiter, Cincinnati Gas & Electric Co., Cincinnati, Ohio, on a coach yard maintenance; *wholesalers lighting specialists*—R. Bruce Thompson, G. E. Supply Corp., Buffalo, N. Y., on a bank; and F. W. Martin, Graybar Electric Co., Chicago, Ill., on a bank.

NLRB Decisions

Three significant decisions involving electrical contractors have been issued under the Taft-Hartley Law by the National Labor Relations Board. All concerned secondary boycotts. Here are the cases:

1. Gould & Preisner, Denver electrical contractor. NLRB found the Denver Building Trades Council and two locals—IBEW and plumbers—guilty of a secondary boycott for seeking to induce the general contractor not to do business with Gould & Preisner, a non-union firm on the AFL "unfair" list.

2. Roane-Anderson Co., operator of Oak Ridge facilities for the Atomic Energy Commission. All but one of the 115 IBEW members employed at the atomic reservation quit last July. NLRB held that this was a strike, and that it was in support of a secondary boycott intended to force Roane-Anderson not to do business with Kiser Electric Co., Knoxville, Tenn., a non-union subcontractor.

3. Samuel Langer, Port Chester, N. Y., electrical contractor. NLRB split 3-2 in ordering IBEW Local 501 and its business agent to stop picketing aimed at compelling the contractor building a $15,000 house not to do business with Langer, a non-union electrical contractor.

NISA Chapters Elect '49 Officers

Annual elections of officers in various Chapters of the National Industrial Service Association resulted in the following slates:

Indiana Chapter, Indianapolis—Chairman—Frank L. Meier, Meier Electric and Machine Co.; vice-chairman—Glen F. Bushman, Kirby Risk Electric Service, Lafayette, Ind.; secretary—R. A. Scherer, Scherer Electric Co.; treasurer—Richard Erber, Capital Electric Service, Indianapolis.

Oregon Chapter, Portland—Chairman—August Verdurman, Skeen Electric Works; vice-chairman—J. C. Reed, Reed Electric Co.; secretary-

30 seconds does it... for JOE RAMSETTER

No drilling or plugging for JOE RAMSETTER. In 30 seconds, he does the complete job of setting pins or studs to accurate positions in steel, concrete, masonry. Just load the light, portable RAMSET TOOL, press against the work and RAM! Fastener sets quicker than a wink—tightly, easily.

No electric lines or air compressors! RAMSET is self-powered, carried in one hand from job to job, always ready to set, instantly, pins and threaded studs up to 6" long and 5/8" diameter. On continuous work, any good workman can "RAMSET" up to 50 fasteners per hour.

Ask for a 15-minute RAMSET demonstration. You'll see why it breaks all records for speed and economy on fastening jobs, pays a profit on every setting.

Ramset FASTENING SYSTEM

Stemco Corporation, Cleveland 16 (Rocky River), Ohio.

In Canada—Globe Machine Tools, Batawa, Ontario.

Stemco Corporation, EC-5
Cleveland 16 (Rocky River), Ohio

Please send details and arrange 15-minute demonstration of RAMSET FASTENING SYSTEM. No obligation, of course.

Name _____

Company _____

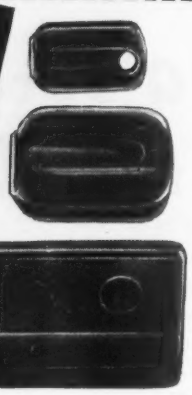
Address _____

ILLINOIS PORCELAIN WIREHOLDER INSULATORS MAKE

Safe Service Connections

Smooth, rounded surfaces protect wire insulation. Deep, sharp screw threads assure easy and firm installation. Non-shrinking metal alloy keeps screws permanently fastened to insulators. Special galvanizing process protects all-steel screws with smooth, even coating. No rust streaks on sides of buildings. These dry process wireholders available in sufficient styles and sizes to meet all requirements. Wet process porcelain supplied on special order.

Look for the name *Illinois* or the trademark on every porcelain product you buy. That's your assurance of the best in porcelain.



ILLINOIS GUY STRAIN INSULATORS

STANDARD TUBES

Glazed, unglazed, split, floor, split floor, headless, curved, crossover split, and crossover. Uniform inside and outside diameters. Sizes 1/2 to 48" long, 5/16 to 3" diameter.

KNOBS

Knobs that don't chip when installed. Cement coated, extra length nail—genuine leather washer—code standard. Wide variety of sizes.

CLEATS

Standard cleats of all sizes and types.

For best results use Guy Strain Insulators made by Illinois. These insulators are manufactured under rigid production control standards, from the careful selection of materials, through all steps leading to a top quality finished product. Uniform firing at constant temperatures eliminates internal stress. Available from large stocks of standard sizes.

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MACOMB, ILLINOIS

treasurer—Herbert Greenwell, L. A. Walker Electric Works, all of Portland.

San Diego Chapter—Chairman—Harold L. Arnhart, Arnhart Electric Works; vice-chairman—Milton Emery, Diesel Electric Exchange; secretary—Frank W. Sloan, California Electric Works, all of San Diego.

Southwestern Chapter, Dallas, Texas—President—John S. T. McDowell, Longview Electric Motor Co., Longview, Texas; vice-president—William C. Duke, Duke Electric Co., Odessa, Texas; secretary-treasurer—J. M. Morgan, Central Electric Co., Fort Worth, Texas.

Tennessee Chapter, Knoxville—President—Earl E. Wright, Dixie Industrial Service, Chattanooga; vice-president—N. G. Welch, Electric Service, Inc., Nashville; secretary-treasurer—J. F. Steffner, Chattanooga Armature Works, Chattanooga.

British Columbia Chapter, Vancouver—President—P. Marks, Marks Brothers; vice-president—B. C. T. Elworthy, Elworthy & Co., Ltd.; secretary—J. Bartholmew; treasurer—F. Hoffmeister, R. Hoffmeister—all of Vancouver.

New Items Appear In Electrical Shows

With backlogs tapering off, manufacturers are placing in production new product ideas that were formerly pigeon-holed in development departments. New equipment as well as variations in existing items are beginning to show up at electrical trade shows throughout the country. Large attendances are indicative of the never ending search for something that will do an electrical job better and more efficiently.

More than 2,000 contractors, engineers, maintenance electricians and others attended the recent 10th Annual Industrial Electrical Exposition held by the Electrical Maintenance Engineers of Milwaukee, Wisconsin. Equipment for industrial applications was shown by some 55 exhibitors at the two-day show. Among the new items that drew the attention of many of those present were:

Slimline and fluorescent fixtures with colored fiber eggcrate louvers.

Residential circuit breaker units that can be added to conventional multi-breaker load centers.

Speed reduction units and gear boxes with ratios from 6 to 1 to 3,666 to 1.

Flexible conduit with a neoprene jacket for machine tool electrical connections.

Adhesive glass tape for motor re-

Speakers at lighting session at recent all-industry electrical conference in Minneapolis included: (L to R) C. M. Cutler, G.E. Lamp Dept., Nela Park; Myrtle Fahsbender, director of home lighting, Westinghouse Electric Corp., Bloomfield, N. J.; and J. O. Kvalsten, Minneapolis contractor and chairman of the Twin-Cities Section, IES.

winding; colored paper tape for conductor identification.

Carbon brushes with a neoprene shock pad to reduce commutator chatter.

Retractable flexible cord reel with rollers to reduce cord wear; similar reel with steel cable for supporting heavy portable tools.

Fluorescent lamp disposal unit that grinds up tubes with a water wash to eliminate possibility of beryllium poisoning if cut by broken tube.

A super-speed photo-flash developed to study bullet flight and turbine blade performance.

Two technical sessions were part of the Milwaukee meeting. At one, Forest Nagler, engineering development division, Allis-Chalmers Mfg. Co., discussed the Bikini Atom Bomb Tests. At the other, J. J. Mellon, chief engineer, Allen-Bradley Co., explored equipment design features that reduce maintenance of industrial motor controls.

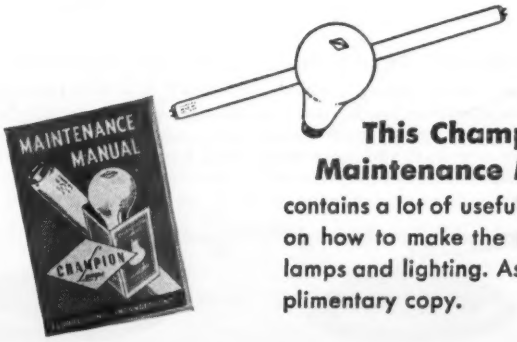
At Kansas City, the Electrical Association sponsored the first all-industry electrical show produced since 1933. Called the Exposition of Electrical Progress, the five-day show was held in the huge Municipal Auditorium; drew an attendance of more than 80,000 (at 60 cents per head) from the Kansas City area and a dozen surrounding states. More than 75 exhibitors displayed hundreds of products, mostly television and home appliances. Occupying the entire mezzanine of the auditorium were education and scientific exhibits of various universities and research organizations.

For those interested in wiring, there

FLUORESCENT AND INCANDESCENT LAMPS

Champion's are the finest quality, longest lasting lamps that we know how to make after fifty years of industrial lamp manufacture.

Low overhead and direct sale through qualified industrial distributors mean minimum lamp and lighting cost to you.



This Champion Maintenance Manual contains a lot of useful information on how to make the most of your lamps and lighting. Ask for a complimentary copy.

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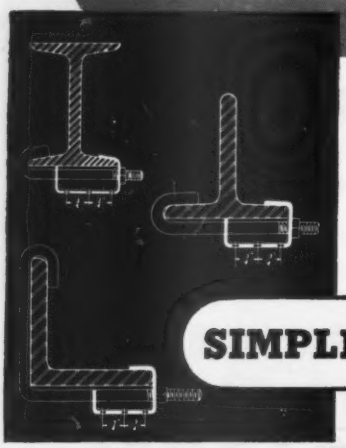
A DIVISION OF CONSOLIDATED ELECTRIC LAMP CO.

MOUNT OUTLET AND JUNCTION BOXES, RACEWAYS AND EQUIPMENT WITHOUT DRILLING BEAMS

Flat Surfaces and Tapped Holes minimize labor

It is now possible to suspend cables, raceways, pipes, boxes and equipment from steel I beams without drilling or special tools. Write or wire today for bulletin number THR 105.



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For the best in OUTDOOR LIGHTING
install the new
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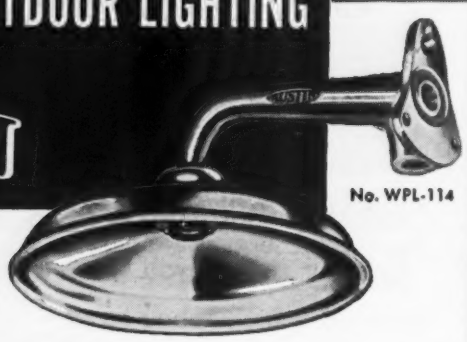


No. WPL-114

DELUXE YARD LIGHT

BUILT FOR LONG RELIABLE SERVICE IN ALL KINDS OF WEATHER

The finest outdoor lighting fixture available, AUSTIN'S new WPL-114 consists of sturdy, rustless cast aluminum bracket and 14-inch heavy gauge steel reflector with baked porcelain enamel finish—green outside and white inside. Reflector rigidly mounted to fixture arm—can't vibrate or break loose. Bracket fitted with ½" conduit threaded hub in back and bottom. Keyhole slot in top of bracket for easy mounting.

AUSTIN No. SPB-12 YARD LIGHT

Straight bracket for pole or wall mounting —12" reflector. Also available with 14" reflector (No. SPB-14).

AUSTIN No. SWB-12 YARD LIGHT

Straight bracket with adjustable mounting flange—12" reflector. Also available with 14" reflector No. SWB-14).

All Austin yard lights come completely packaged with three lag screws, wire and Duxseal compound, ready to be wired and installed.

The M. B. Austin Company
NORTHBROOK, ILLINOIS

3169

were various displays of motors, controls, wireways and associated equipment. Adequate wiring was effectively handled by exhibits of the Greater Kansas City Chapter, National Electrical Contractors Association and Local B-124, International Brotherhood of Electrical Workers.

Concurrent with the Exposition was an eight-session Electrical Developments Forum, co-sponsored by the Electric Association, Midwest Research Institute and Chamber of Commerce of Kansas City. Such industrial topics as X-Ray Applications, Glass in the Lighting Industry, Electric Power, Electrical Instrumentation, Atomic Energy Developments and Research, headlined these sessions. Speaking before invited guests at the various sessions were: Raymond Wells, manager, X-Ray Division, General Electric Co., Kansas City; Clarence W. Clarkson, Corning Glass Works, Chicago; Tomlinson Fort, Westinghouse Electric Corp., Pittsburgh; Chapman Turner, production manager, Kansas City Star; S. R. Cowan, publisher, Radio Service Dealer, New York; Joseph Morin, Shure Brothers; George Kearse, American Phenolic Corp., Dr. George Ziegler, director, Midwest Research Institute. Kansas City; Dr. Harley A. Wilhelm, assistant director, Iowa State Atomic Research Institute; and Arthur W. Gerth, chief, applications and loans division, Rural Electrification Administration, Washington.

Enlist Contractor Aid In Lighting Sales

The most important man in the lighting industry is the electrical contractor, J. M. Stedman, general sales manager, Pennsylvania Power and Light Company, told the commercial sales section meeting of the Edison Electric Institute's 15th Annual Sales Conference at Chicago's Edgewater Beach Hotel. Depending upon his knowledge of lighting, the contractor can sell an installation up or down, Stedman noted. To train more than 1,200 electrical contractors, architects and others in the territory, Stedman's company sponsored a series of four "Planned Lighting Clinics" that were presented in ten towns to cover each operating division.

Illumination theory, light sources, layout problems, residential lighting and adequate wiring were the general subjects covered. Of the 4,352 total attendance at all four clinics, 3,185 were contractors, architects and other industry representatives. Result: A consistent run of contractor requests for help in planned lighting layouts.

Mr. Stedman believes this is one method by which utilities can develop Planned Leadership for Planned Lighting Revenue.

That home lighting presents a wide field for sales expansion was dramatically presented in a General Electric lamp department skit. Surveys indicate the average home needs four times the amount of light it now has—a 173 percent increase in connected load and a 175 percent increase in kilowatthours sold for the industry. Superseding previous standards is the 1949 "Sunshine Home" with a recommended 26 portable lamps and 23 fixtures with a total of 5.500 watts, it was revealed. Most effective tool to increase home lighting standards, is the CLM lamp when effectively promoted and intelligently merchandised, the audience was told.

J. V. Baker, rural electrification manager, Sears Roebuck & Co., told the EEI farm section how the Mail Order and Retail business is adding kilowatts to utility loads through cooperation with farm service and electrification advisers, agricultural engineers and utility home economists. Typical results of such an activity was noted in a group of 35 farms where adequately wired farmstead installations were sold. Baker revealed that each customer purchased an average of $800 in wiring, plumbing and farm and home electrical equipment within the first year after receiving service. He noted that a cost breakdown indicated the average farmstead wiring job ran $400. In one survey, 17 additional customers bought $406 additional in lighting fixtures, motors, welders and $3,500 of farm electrical equipment. Better lighting in the farm home led to sales of new home furnishings, he added.

Television was the subject of two papers. George W. Wallace, manager television sales promotion, National Broadcasting Company, predicted that the industry will produce two million receivers in 1949 and reach an annual production of five million by 1953. Since the war, the number of sets in use has increased from 10,000 to 1,300,000 as of March 1st. Over 40 million people now live within range of television service, he revealed. Wallace believes television's use as an advertising and public relations medium will benefit the utilities more than mere load building.

In Detroit, television sales comprise from 30 to 50 percent of major appliance sales, Fred A. Compton, general sales manager, Detroit Edison Company, told EEI delegates. Consequently sales of other load-building appliances have decreased rather sharply, he added. Detroit Edison statistics indicate that net monthly increase in use of electricity per television receiver is

IDEAL FOR ATTIC FANS, UNIT HEATERS, AIR CONDITIONING AND SIMILAR USES

Small in size, but BIG in Quality; High accuracy at Low Cost—all features that you can offer when you sell the new Sangamo Interval Type Timer. While primarily designed for positive attic fan control, these timers are suitable for many other applications.

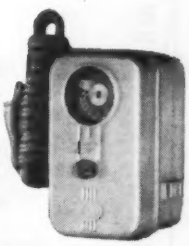
Sangamo Type T Timers provide an automatic OFF operation following an elapsed ON interval which is manually preset for each operation. The unusually quiet, low-speed hysteresis-type motor operates only after the manual setting has been made. The operating range includes any period from 15 minutes to 12 hours.

Sangamo Type T Timers are extremely attractive in appearance, may be either wall or switch box mounted, and are fully guaranteed and priced right!

* * *

The new Sangamo Timer is also available in a portable "plug-in" type (Type TJ), rated at 10 amperes or ¼ hp. at 120 volts A. C., for temporary appliance installations.

Sangamo also offers a new portable "plug-in" Time Switch. The Type SJ, rated 10 amperes or ¼ hp., at 120 volts A.C., makes it easy to install automatic time control. Just plug it in and it goes to work.



Bulletins 1070A and 1053A give full information.

SANGAMO ST4910

ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

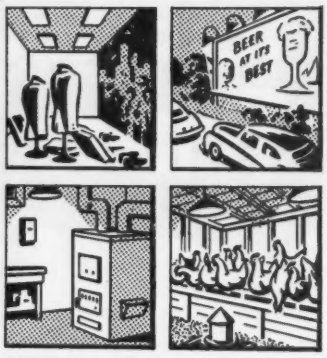
50TH ANNIVERSARY SANGAMO 1899 - 1949

SWITCH "ON" • REGULARLY
• AUTOMATICALLY
SWITCH "OFF" • ELECTRICALLY

WITH A FAMOUS **TORK** TIME SWITCH
PLAIN OR ASTRONOMICAL

Tork Clock Time Switches are world renowned for their dependability and accuracy. They require no regular attention, and are available in many electrical capacities for both indoor and outdoor use.

There's a TORK CLOCK for every need. Economically priced from $9.50
Send for free literature.



NEW! SPECIAL FEATURES ASTRONOMIC "FOLLOW the SUN"
30 HOUR SPRING RESERVE.

TORK CLOCK CO., Inc.
1 GROVE ST., MOUNT VERNON, N. Y.

We've Got a...

FULL HOUSE!

EVERYTHING FOR THE COMMERCIAL OR INDUSTRIAL ELECTRIC REPAIR SHOP!

WRITE FOR FREE, 238 PAGE ILLUSTRATED CATALOGUE
(On Your Letterhead, Please)

COMPLETE - READING ELECTRIC CO., INC.
102 S. JEFFERSON ST., CHICAGO 6, ILL. . . TELEPHONE: CENTRAL 6-5390
"Your Best Source of Supply"

about 18 kilowatthours—about 15 percent of the present national average of 130 kwhrs. per month per residential customer. During the past year, DECO's television customers' bimonthly bills increased 18.3 percent—11.2 percent due to television and 7.1 percent to additional lighting and other appliances. Compton urged utilities to give television the same consideration as other appliances; keep thoroughly acquainted with all developments in the industry; maintain personnel trained in television use and service problems; assist in orderly development of the market; and establish channels for exchange of television information within our own industry.

A realistic picture of the appliance industry was presented by T. J. Newcomb, sales manager, Westinghouse Electric Corp. Appliance Division, who favors a 2½ percent excise tax on a wide variety of appliances over the present 10 percent tax now discriminatingly applied to certain items. The appliance industry has too many dealers (2½ times as many refrigerator dealers as in 1941), Newcomb noted and added that there are going to be some casualties under the present buyer's market.

Harry Restofski, chairman, EEI commercial division general committee, told the group that potential markets open to the utility industry dwarf those already sold. Pointing to specific sales opportunities in farm, commercial, residential and industrial markets, he cited a 15 million horsepower potential in electric crop dryers; an 8,950,000 kilowatt potential in commercial electric cooking; a 165 billion kilowatthour potential (annual) in all-electric residential kitchens; and an annual increase of 38 billion kilowatthours if lighting alone could be brought up to present-day recommended standards. To reach these potentials, selective and effective selling must be done, he concluded.

In an address to the Industrial Power Section, W. V. O'Brien, general sales manager, General Electric Co., Apparatus Department, predicted a 50 percent increase in electric power sales with a 66 percent increase in generating capacity during the next seven years.

In a brief summary of the condition of the utility industry during the present stage of its expansion, EEI President E. R. Acker, revealed that load increases in most parts of the country are leveling off, conforming with the performance of other economic indicators. New generating station efficiency is having a substantial effect in keeping rate increases to the minimum and maintaining the industry's record of high-standard, low-cost service, he concluded.

Post-session conference at recent RECA convention in Chicago is held by (L to R) R. W. Lynn, REA Regional engineer and L. R. Bradshaw, B-line Construction Company, Oklahoma City hi-line contractor.

Dates Ahead

National Fire Protection Association—53rd annual meeting, Fairmont, Hotel, San Francisco, Calif., May 16-19

North Dakota Electrical Contractors Association—Annual convention, New Clarence Parker Hotel, Minot, N. D., June 5-7.

National Industrial Service Association—Annual convention, Hotel Jefferson, St. Louis, Mo., June 9-11.

Store Modernization Show—Grand Central Palace, New York, June 19-24.

New York State Association of Electrical Contractors and Dealers, Inc.—Saranac Inn, N. Y., July 2-9.

Illuminating Engineering Society—National Technical Conference, French Lick, Ind., September 19-23.

National Electronics Conference—Edgewater Beach Hotel, Chicago, Ill., September 26-27.

International Association of Electrical Inspectors—Eastern Section, Hotel Statler, Boston, Mass., August 11-13; Western Section, Hotel Statler, St. Louis, Mo., September 26-28; Northwestern Section, Butte, Mont., October 3-5; Southwestern Section, Hotel San Diego, San Diego, Calif., October 10-12; Southern Section, Hotel Shamrock, Houston, Texas, October 17-19.

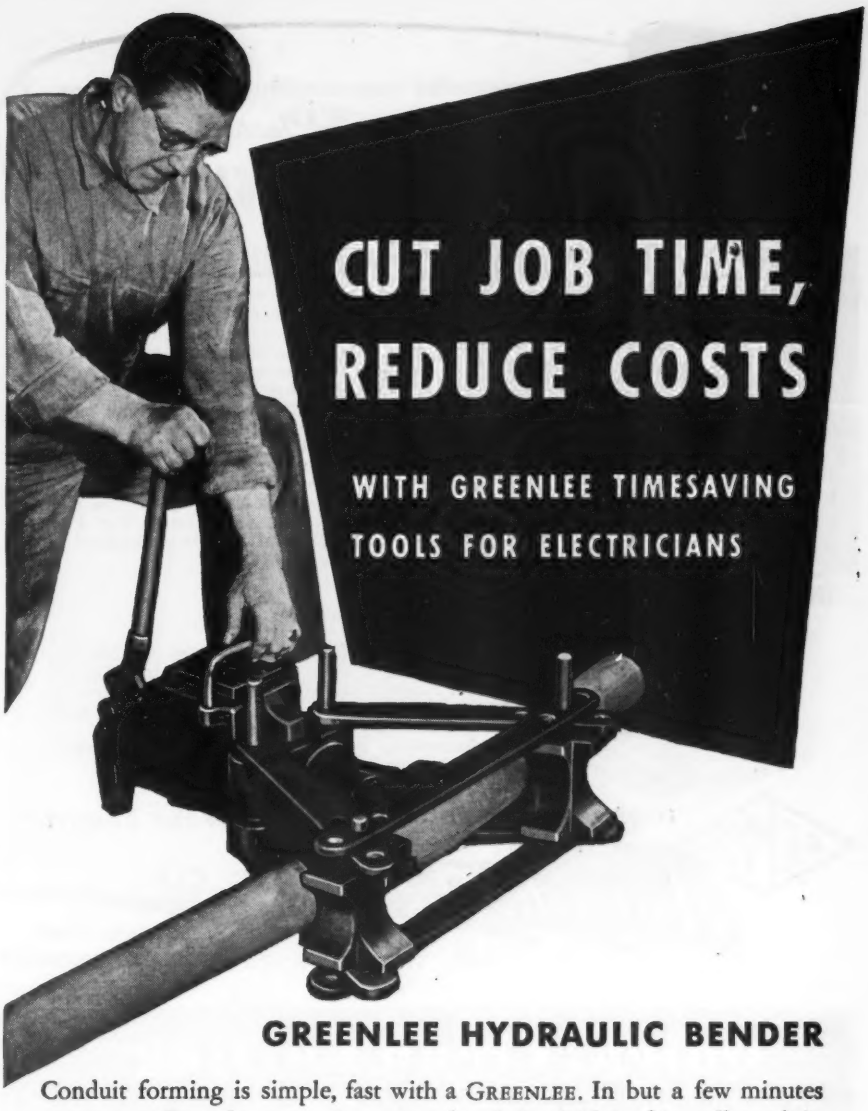
National Electrical Contractors Association—Annual convention, Rice Hotel, Houston, Texas, November 7-10.

National Electrical Manufacturers Association—Chalfonte-Hallon Hall, Atlantic City, N. J., November 13-18.

Manufacturers News

GRAYBAR REORGANIZES SALES DEPARTMENT

Graybar Electric Company, New York, has announced that the sales activities on all lines will be headed up by George F. Hessler, vice president. The two key sales executives under Mr. Hessler's direction will be C. S. Powell, vice president, who will head up appliance communication lines, and H. P. Litchfield, general supply sales manager, who will head up all supply lines. The advertising and sales promotion



GREENLEE HYDRAULIC BENDER

Conduit forming is simple, fast with a GREENLEE. In but a few minutes *one man* easily makes smooth, *accurate* bends in rigid or *thin-wall* conduit, pipe up to 4½", tubing, bus-bars. No kinking, wrinkling or other damage to conduit. And the GREENLEE is compact, *portable* . . . makes it easy to do bending *right on the job.* Often pays for itself on first few jobs through big savings in time, labor, materials.

KNOCKOUT TOOLS enlarge a hole for conduit or cable in 1½ minutes or less. Cut *smooth* openings up to 3½" in metal, bakelite or hard rubber up to ⅜" thick.

BORING TOOLS that produce smooth openings fast. Electricians' Unispur and Solid-Center Auger Bits . . . Bell Hangers' Drills . . . Bit Extensions.

HAND BENDER quickly makes small-radius bends in steel, copper, brass, and aluminum tubing, conduit or pipe. Makes neat bends up to 180°.

TOOLS FOR CRAFTSMEN

GREENLEE

WRITE GREENLEE TOOL CO., 1745 COLUMBIA AVENUE, ROCKFORD, ILLINOIS
for complete data on above equipment as well as GREENLEE Joist Borers • Pipe Pushers • Spiral Screw Drivers • Automatic Push Drills • Chisels, Gouges and many other quality tools

For unexcelled dependability and permanence

Specify and Install

AEMCo **TIME SWITCHES**

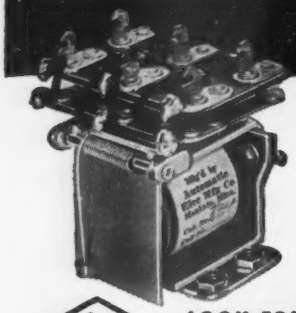
EQUIPPED WITH SYNCHRONOUS, SELF-STARTING MOTORS

Highest quality material and unexcelled craftsmanship combine to make Automatic Time Switches the preference of those who demand *long life dependability backed by an unconditional guarantee.*

Compact, *carefully engineered* Automatic Time Switches have new type, easily set trip levers. Trip levers and dial are visible thru window in attractively finished, tamper-proof case.

Stock Models: Single Circuit, Single Pole, 10 Amperes Capacity to Two Circuit, Four Pole, 45 Amperes Per Pole Capacity. Special models engineered to your requirements.

A. C. OR D. C. OPEN OR CAN TYPE WITH TUBE-BASE PLUG-IN FEATURES



AEMCo **RELAYS**

Automatic Electric Relays . . . Midget, Interlocking, Circuit Control, Latching, Adjustable . . . are built to exacting high standards to assure unexcelled dependability. Custom built relays designed to your specifications.

Accurately rated Automatic Electric Relays deliver "Diamond Quality" performance.

Write for complete specifications.

LOOK FOR THE DIAMOND SEAL FOR DIAMOND QUALITY

AEMCo *Automatic Electric* MFG. CO.

50 STATE STREET
MANKATO, MINNESOTA

Quick, Clean Cutting

For Electricians and Linemen

Clauss

ELECTRICIANS SCISSORS

These sturdy, keen-edged scissors win praise of electricians and linemen for cutting wire, insulation or light metal. Hot drop forged, hardened and tempered and fully nickel plated, 5" long, with heavy blades and shanks. Back of blades has deeply serrated scraping and filing edge. Stock No. 925.

Order from your Jobber or write direct to...

THE HENKEL-CLAUSS CO.
FREMONT, OHIO
New York Offices: 1107 Broadway, ALgonquin 5-0506
Shear Quality Since '77

G. F. HESSLER

department, headed by K. B. Hopkins, will report to Mr. Hessler.

Willard Henges, district manager at Cleveland, and H. P. Litchfield were elected company directors.

WESCO APPOINTMENTS

Announcement has been made of the appointment of W. L. Howlett as manager of the Flint branch of the Westinghouse Electric Supply Company, succeeding F. N. Wyatt, who has been assigned special duties. J. G. Lee, formerly Wesco headquarters training supervisor, has been named Cleveland branch manager, succeeding Mr. Howlett.

C. D. Fagg has been appointed Northern California District service manager succeeding E. J. Schmidt, resigned. He will have his headquarters at Oakland, Calif.

SIDNEY ENDER JOINS BELMET PRODUCTS

Sidney Ender, for the past 18 years president of Ender Manufacturing Company, has sold his interest in that

S. ENDER

company and has joined the Belmet Products, Inc., 250 Moore Street, Brooklyn, as director of sales and development engineering for the lighting fixture trade.

CUTLER-HAMMER CHANGES

Two new office moves have been announced by Cutler-Hammer, Inc., Milwaukee, Wis.

The Columbus office, now located at 2700 East Main Street, operates as a branch of the Cincinnati district office under the direction of R. D. Yoder.

Headed by E. J. Gove, the Youngstown office at 25 East Boardman St., is a branch of the company's New York district office.

•

The new Denver representative of **Allen-Bradley Co.**, of Milwaukee, Wis., is the Young Electric Manufacturing and Supply Co., 2134 Curtis Street. W. E. Young is owner and manager.

•

Announcement has been made by the **Slater Electric & Manufacturing Co.,** Woodside, N. Y. of the appointment of two representatives for its line of wiring devices. Robert R. Prussia of 224-226 Harriet St., San Francisco, California will cover the San Francisco and Northern California area. The Southern California and Arizona area will be represented by J. C. Richards and Company of 335 Towne Ave., Los Angeles.

•

C. Gordon Saffer of Omaha, Nebraska has been appointed to represent **Silvray Lighting, Inc.,** in Missouri, Kansas, Nebraska and Colorado.

Other appointments include G. H. Arnold to the Atlanta territory and Frank M. Moos to the Florida territory. Mr. Moos was formerly lighting manager for Graybar Philadelphia District.

•

Colonial Electric Products, Inc. of East Paterson, N. J. has appointed Colonial Sales Distributors of Rochester, N. Y., as regional factory distributor, in Western New York, including Rochester and Buffalo.

•

Tomic Sales and Engineering Company, Detroit, announces the appointment of the following representatives Glenn H. Arnold, Atlanta, Ga., covering Alabama and Georgia; Chilton and Chilton, Jackson, Miss., covering Arkansas, Louisiana, Mississippi, Western Tenn.; Joseph N. Crevasse, Jacksonville, Fla., representing Florida; and James W. Carroll, Charlotte, N. C. representing North and South Carolina, Eastern Tennessee.

LOOK FOR EXTRA QUALITY WHEN YOU BUY FUSES

You no longer have to accept products that meet only minimum requirements. You can demand and get the best buy . . . the product that gives you more for your money. Pierce is the best buy in fuses. It costs you no more to get these *three extra* protection features.

PROTECTION AGAINST BLOW FROM HARMLESS SURGES

Pierce "Balanced Lag" link sustains harmless jolts and surges in the working overload range which often blow ordinary fuses. Yet it blows instantly on dangerous short or ground. By sustaining all safe loads, blowing only when danger threatens, "Balanced Lag" eliminates costly, unnecessary power interruptions.

PROTECTION AGAINST CASE FAILURE

The strong tubular bridge construction and simplicity of design in Pierce fuses ensure maximum case life and clip contact, and prevent the misalignment common to ordinary fuses.

PROTECTION AGAINST AFTERBLOW

Pierce fuses are screen-ventilated and operate from 10 to 50 per cent cooler, preventing unnecessary blow from stored or secondary heat held in ordinary fuses.

PIERCE

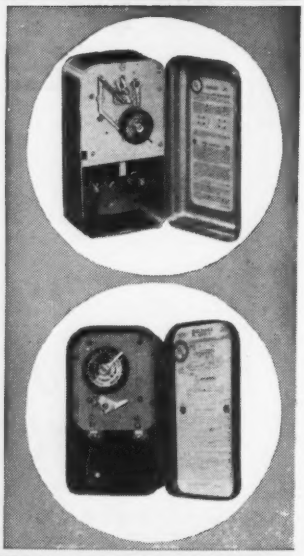
For Forty Years, Specialists in the Design and Manufacture of Fuses

RENEWABLE FUSES, INC.

177 Pacific Avenue ★ Buffalo 7, N. Y.

Regular as Clockwork . . .
IN SERVICE, AND IN SALES

• Trouble-free time control calls for equipment that's simple, compact, economical and thoroughly dependable. For more than 38 years RELIANCE Automatic Time Switches have lived up to their name . . . meeting practically every time control requirement with years of *reliable* service. Wide adaptability, low installation and maintenance cost—plus *dependability*, makes the Reliance line of heavy duty "Badger" and "Model W" time switches a favorite with contractors and their customers. Reliance Time Switches . . . guaranteed 50% longer . . . are available in 30 or 50 Amps, standard or 2-circuit, plain or astronomic, indoor or outdoor cases. For complete information, write — RELIANCE AUTOMATIC LIGHTING CO., 1937 Mead St., Racine, Wisconsin.



RELIANCE TIME SWITCHES

DRILLS HOLES CLEAN FAST

WITH THE ORIGINAL
ROTARY CONCRETE DRILL BITS

DRILL BILLY says:
"MAKE BETTER HOLES FOR LESS MONEY"

Drilling through masonry with a Rotary Concrete Drill Bit is a revelation in speed, precision, saving.

Used as directed, Rotary Bits will drill a profuse number of holes before dulling the sharp cutting edges. They can be re-sharpened many times, and will continue their high-speed efficiency with each sharpening. They'll save money for your concern.

For use in ordinary electric or rotary drills. Standard sizes from ¼" to 2" diameter. Larger sizes on request. Free factory re-sharpening until further notice. Write for free illustrated folder giving complete details and prices.

ROTARY CONCRETE DRILL COMPANY
650 S. ARROYO PARKWAY • PASADENA 1, CALIFORNIA

E. T. Rummel, 12690 Elmwood Ave., Cleveland; R. W. Briskey, 3049 East Grand Blvd., Detroit; and T. J. Sullivan, Jr., 240 East Ontario St., Chicago, have been named district representatives in Ohio, Michigan and Chicago respectively, for the **Hertner Electric Company,** Cleveland, Ohio.

•

H. J. Fonda has recently been appointed sales manager of the jobbing division for the **Arrow-Hart & Hegeman Electric Co.** Mr. Fonda has been transferred from Dallas, Texas where he was district manager for the Southwestern territory for ten years.

•

Unistrut Products Company, Chicago, Ill., announces the appointment of Edwin A. Nickel as advertising and sales promotion manager. He was formerly sales and advertising manager of Mitchell Mfg Company

•

United States Rubber Company is moving its Chicago branch offices from 440 W. Washington Street to the Merchandise Mart Building.

The appointment of Frederick S. Bartlett as factory manager of the Bristol, R. I. plant has been announced.

•

Paul S. Castner, formerly application engineer for load center and network transformers at **Allis-Chalmers** Pittsburgh Works, has been promoted to a new post of assistant sales manager. He will serve under R. W. Beard, sales manager, Pittsburgh Works.

•

Janette Manufacturing Company, Chicago, Ill. has announced the appointment of Henry W. Miller Electrical Co., Omaha, Neb. serving Nebraska and Western Iowa; and George E. Zweifel & Co., Portland, Ore. covering Oregon, Washington and Idaho.

•

Blink Electric Company, Cincinnati, Ohio, has been incorporated to manufacture and deal in all kinds of neon, fluorescent and electrical parts. Incorporators are Carroll D. Blincoe, John G. Wilmes and Ernest V. Thomas.

•

Appointment of H. K. Dewees Company, Atlanta, Ga. as southeastern representative of the **Webster Electric Company,** Racine, Wis. has been announced.

John C. Dolph Company, has moved its general office from 1060 Broad St., Newark, N. J. to its new plant location at Monmouth Junction, N. J.

•

The Adalet Manufacturing Company, Cleveland, Ohio, has announced the appointment of Charles J. Leesman Company, 406 Elm St., Cincinnati, Ohio, as factory representative for Southern Ohio and Kentucky.

•

James J. Sutherland has been appointed general manager of the electronics division of **Sylvania Electric Products Inc.**

•

N. E. Passman has been appointed sales manager of the Lamp Division of **Oxford Electric Corp.,** Chicago, Ill.

•

Motorola, Inc., Chicago, has opened a new research laboratory in Phoenix, Arizona. The new laboratory will be devoted exclusively to electronic research in military fields.

•

The Electric Products Company of Cleveland, Ohio, recently appointed E. Lowe McIntyre, Jr. as assistant sales manager in charge of new market developments. He will be located at headquarters in Cleveland.

•

Arthur A. Blue has been appointed manager of the instrument division of **Thomas A. Edison, Inc.,** West Orange, N. J.

•

On May 15th, the **W. H. Long Company** is moving its manufacturing facilities to 108-114 W. Illinois St., Chicago, Ill.

•

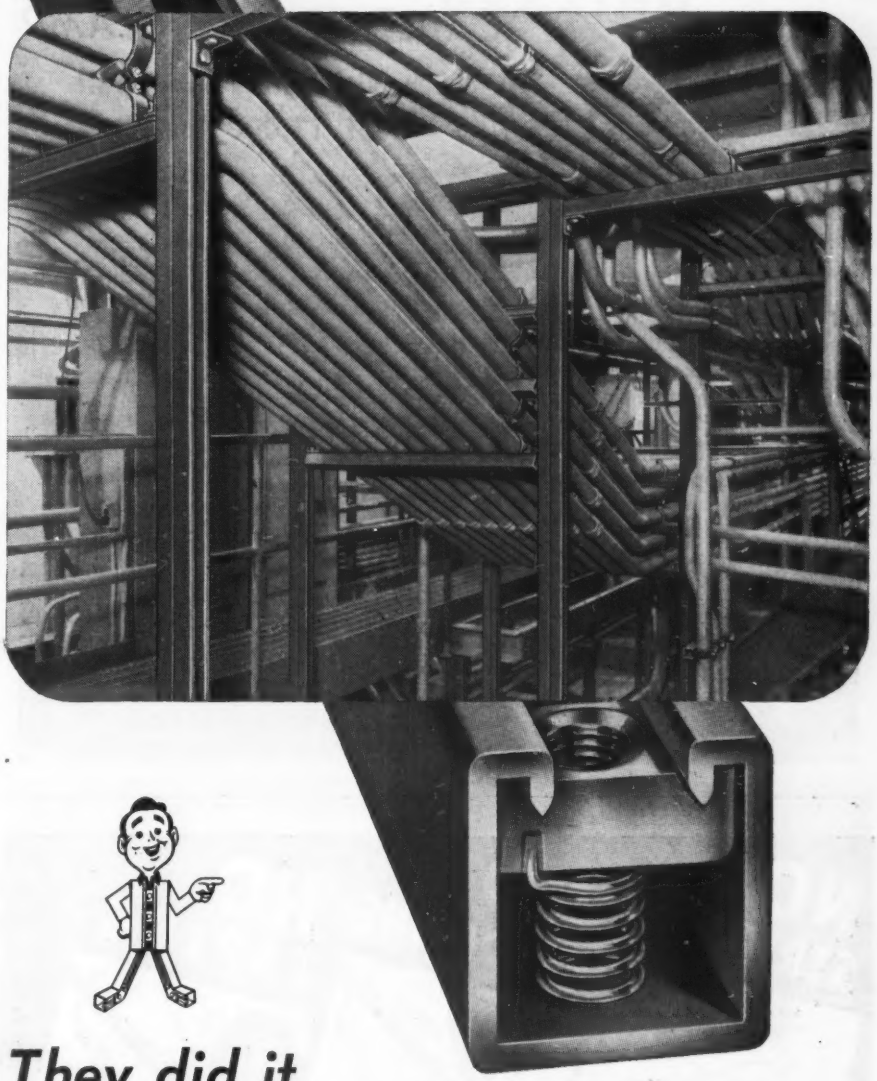
Eutectic Welding Alloys Corp., New York, N. Y. has opened a new plant in Flushing, L. I., N. Y.

•

A plant consisting of industrial buildings containing 90,000 square feet located on an eight acre tract at Mt. Vernon, Ill., has been purchased by **Wagner Electric Corporation** of St. Louis.

CONDUIT RACKING MADE EASY!

An ordinarily difficult job made easy with versatile Unistrut channel, fittings and clamps. Bends, turns and adjustments quickly accommodated through Unistrut's unusual flexibility.



They did it with

"UNISTRUT"
ALL-PURPOSE METAL FRAMING

You also can quickly, easily and economically build all types of shelving, framing, supports, mounts, racks, tables and benches—pipe and cable hangers, and fluorescent fixture supports—and many other structures with only a hacksaw and wrench.

Here's real "strength without bulk." Completely adjustable and reusable, Unistrut is steel channel with a continuous slot. You simply insert the Unistrut spring nut at approximate point where you wish to attach another framing member, slide to exact position, bolt and tighten. No drilling or welding required.

Unistrut gives flexibility and installation advantages that can't be attained by old-fashioned methods of frame construction.

ALL PURPOSE
UNISTRUT
METAL FRAMING

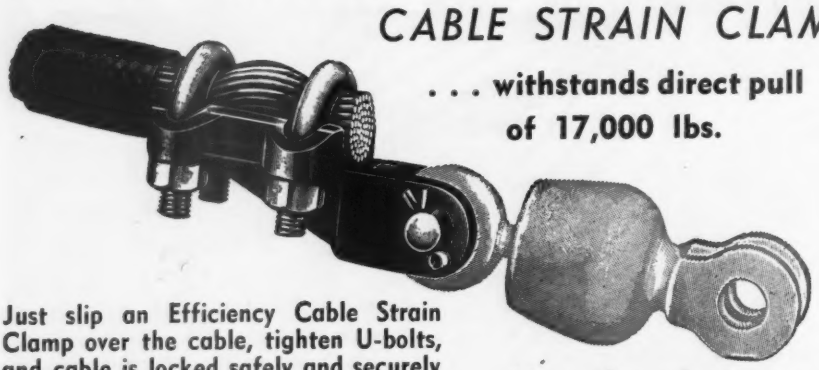
Write for Bulletin No. 36

PRODUCTS COMPANY
1013 W. Washington Boulevard
Chicago 7, Illinois • Phone MO 6-2665
Representatives in Principal Cities

"EFFICIENCY" DEVICES FOR CONDUIT and CABLE SUSPENSION

The POWERFUL GRIP of the "Efficiency" CABLE STRAIN CLAMP

. . . withstands direct pull of 17,000 lbs.



Just slip an Efficiency Cable Strain Clamp over the cable, tighten U-bolts, and cable is locked safely and securely without possible strain or damage. "H" construction of clamp and high ridge across center of cable channel prevents cable from slipping.

Write for Catalog 38-A today.

Note these features:

- Withstands direct pull of 17,000 lbs.
- Takes cable from 1/0 to 1,500,000 c.m.
- 3 clamp sizes cover all cable sizes
- Furnished with eye or clevic
- For AC or DC service

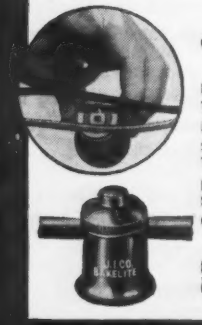
Efficiency ELECTRIC AND MANUFACTURING CO.

MANUFACTURERS OF EFFICIENCY ELECTRICAL DEVICES FOR CONDUIT, WIRE AND CABLE SUSPENSION

EAST PALESTINE, OHIO

NO STRIPPING NO SOLDERING NO TAPING

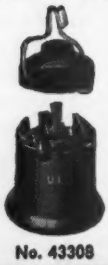
with "UNION" PIN TYPE SOCKETS!



Unscrew socket TOP, lay wires in grooves of socket, and screw TOP on. Pin points penetrate insulation and make contact.

Place on wires at desired intervals.

Ever-Ready Pin Type Sockets offer the most convenient means of obtaining outdoor temporary lighting. Tedious wire stripping, soldering and taping is eliminated. Recommended for use on stranded wire only. Specify "UNION" Medium Base Ever-Ready Sockets!



No. 43308

UNION INSULATING CO., INC.

PARKERSBURG, W. VA.

Rome Cable Corporation, Rome, N. Y. announces the appointment of F. S. Marks as sales promotion manager with offices at Rome, N. Y. Prior to this appointment Mr. Marks served for a number of years as district sales manager in the company's Atlanta office.

C. R. Stegin has succeeded Mr. Marks as sales representative, serving the states of Florida, Georgia and South Carolina.

•

The appointment of New England Manufacturers' Sales Company of Medford, Mass. as representatives of the **Western Insulated Wire Company,** has been announced.

•

Morton Gregory Corporation has sold the American manufacturing and sales rights to the CO-Z-AIR portable electric radiator to the **Conco Engineering Works,** Mendota, Ill.

•

At the last Board of Directors meeting, the **Euclid Electric & Mfg. Co.** of Madison, Ohio, elected two new directors, W. M. Merchant and R. J. Andrews. Mr. Merchant has been with the company since its start in 1922 and Mr. Andrews joined the organization in 1936.

•

Paul T. Persons has been appointed Carolinas' district representative of the **Oliver Iron and Steel Corp.,** pole line materials division. Mr. Persons will make his headquarters in Charlotte, N. C. and will service the states of North and South Carolina and Eastern Tennessee.

•

General Switch Corp. in Brooklyn, N. Y. has named the Slaybaugh-Thompson Co., Denver, Colo. to represent them in Colorado, Utah and Wyoming.

•

Revere Copper and Brass Incorporated, New York, recently opened a new rod and tube mill at 6500 East Slauson Avenue, Los Angeles, Calif.

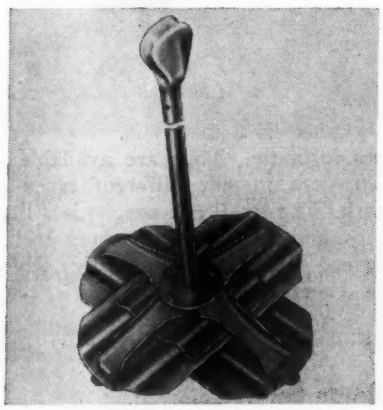
•

The appointment of James E. Ziegler to the sales engineering force of the **Cooper Alloy Foundry Co.,** Hillside, N. J. has been announced. He will be stationed in Cleveland, Ohio, to provide technical service to the Pittsburgh-Cleveland-Detroit areas.

MORE EQUIPMENT NEWS

[FROM PAGE 110]

or all other master phones on the system. No batteries or other power supply is needed to operate these systems. The Wheeler Insulated Wire Company, Inc., 150 East Aurora St., Waterbury 91, Conn.

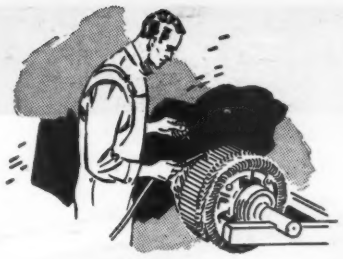


Pole Line Anchor

A new earth-expanding pole line anchor has been developed. Employing a pusher arm principle of expansion, the unit prevents under-cutting of the hole when expanding and minimizes earth resistance to expansion. The housing for the blades provides a top and bottom plate which are locked together securely by means of a tube through the center of the plates. When pressure is exerted on the top of the blade housing, the blades expand uniformly at direct right angles, and wedge solidly into the soil. Interlocking ridges on the blades and housing plates prevent a twisting action, and provide equal distribution of holding power. Retainer nut on bottom of housing enables anchors to be salvaged. It is available in six sizes, including two and four blade styles, with ratings from 3,000 to 12,000 pounds. Oliver Iron and Steel Corp., Pittsburgh, Pa.

Tool

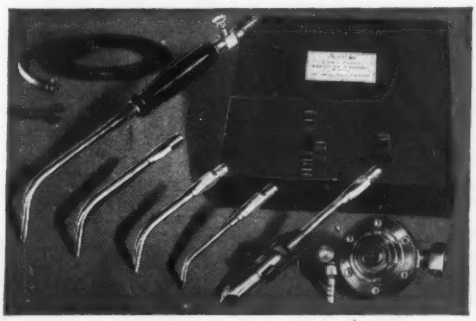
An improved powder actuated fastening tool to replace the Tempotool has been announced. Known as "Ramset Fastening System", it incorporates not only the fastening tool, but also a varied line of steel fasteners and powder charges. The tool is actuated by a powdered charge of several different strengths, which upon being exploded within the tool, force the steel studs or pins into steel, concrete, masonry



SOLDERING
HEATING
BRAZING

Prest-O-Lite Trade-Mark 5-in-1 Precision-Control Outfit

Four stems and soldering copper cover every electrical job, from heavy soldering or heating to wire splicing or finest work on delicate instruments . . . Burns "Prest-O-Lite" Acetylene, from handy, small tanks, at automatically regulated, constant pressure . . . Needle valve flame adjustment . . . Full heat (2,800 deg. F.) instantly, without pumping, priming, or warmup . . . No smoke or fumes . . . Light and easy to handle.



● Ask your jobber or write us for more details. The Linde Air Products Company, 30 E. 42nd St., New York 17, N. Y. In Canada: Dominion Oxygen Company, Limited, Toronto.

The term "Prest-O-Lite" is a registered trade-mark of The Linde Air Products Company, a Unit of Union Carbide and Carbon Corporation.

Precision Model $22.50
Standard Model 16.50

ORDER FROM YOUR LOCAL JOBBER

STONCO

EASIER INSTALLATION
LARGER FLOOD AREA

Better mounting because of improved thread fit. Lighter weight. Trough design gives greater room for wiring. Wider light spread area. Stonco equipment has complete adjustability—vertical and horizontal. Easier to set for aim. Can be completely assembled on the ground and wired on the pole.

A Contractor's Dream

SOLD EXCLUSIVELY THROUGH QUALIFIED WHOLESALERS

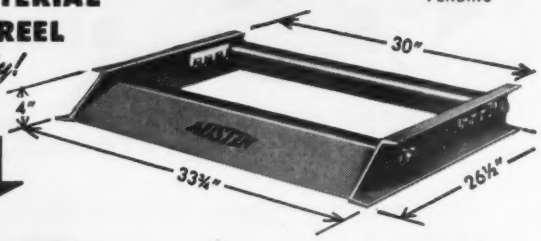
STONCO

STONE MANUFACTURING COMPANY
489 Henry Street Elizabeth 4, N. J.

Use the AUSTIN Reel Roller

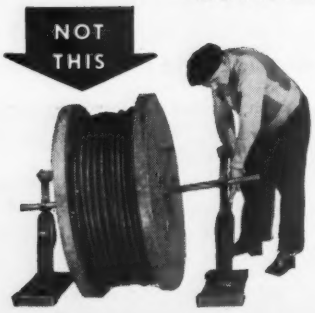
TO HANDLE ANY MATERIAL DISPENSED FROM A REEL
quickly, easily and safely!

PATENT PENDING



AUSTIN No. 600 REEL ROLLER

MAXIMUM CAPACITY: 4000 LBS. WEIGHT: 75 LBS. EACH



OUTSTANDING ADVANTAGES:

1. Ramp makes loading fast and easy
2. Five adjustable slots take various reel diameters
3. Thumb screw locks front roller for reel removal
4. Single unit takes reels up to 30" wide
5. Bolt two units together for reels up to 64" wide
6. Higher back roller prevents reel from coming off roller when material is dispensed
7. Reel rolls on grease packed flanged ball bearings
8. Bright orange finish makes reel readily visible—helps to eliminate accidents
9. Use on the job, truck, or in warehouse

The M. B. Austin Company
NORTHBROOK, ILLINOIS

8144

SUPERIOR BRUSH ASSORTMENTS in *Transparent Boxes*

NOW... *You can plainly see 'em!*

Superior scores a "first", packing carbon brush sets in unique transparent plastic boxes. Thus visibility in packaging, a big advance in merchandising, is added to Superior's 30-year quality. Distributors and users can see instantly the brushes in every compartment. *More salable;* better-looking on everybody's shelves; stock several assortments and see.

Ask for details about Assortments 2, 20 and 30.

Our 30th Year

SUPERIOR CARBON PRODUCTS, INC
9113 GEORGE AVENUE • CLEVELAND 5, OHIO

"Since 1919"

SUPERIOR CARBON BRUSHES

and other hard materials. Tool operates instantly. They are available in two sizes to suit different types of work. The small one weighs less than 5 lbs. and the larger one about 10 lbs. Stemco Corporation, Rocky River, Cleveland 16, Ohio.

Dynamometer

A new hydraulic dynamometer has been developed for load-testing motors. Tests that can be made with unit include idle, pull-in, pull-up, full-load and locked. The locked test can be made without having to shut off the motor to insert a locking pin or similar device. Dynamometer is foot controlled, and both the operator's hands are free. Exact food-pounds of torque can be read directly from gauge. Assembly No. SA-483 is of 30 foot-pounds capacity, and has adapters for ½, ⅝, ¾ and 1 inch motor shafts. Unit comes assembled on a steel bench top, approximately 36 inches square, which may be mounted on standard steel bench legs or existing benches in test or assembly lines. Wagner Electric Corp., 6488 Plymouth Ave., St. Louis 14, Mo.

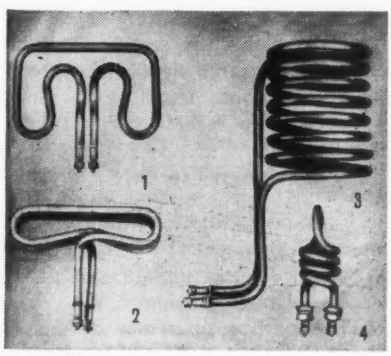
Range

A new Bilt-in electric range for small kitchens has been added to this line. The SU-3 cooking top consists of three Thermo-Klean heating units, is of stainless steel and measures 35 inches long by 17¾ inches wide. The rough-in box, including drip trays, is 10¾ inches deep and the whole is installed in a cabinet to the builders' specifications, wooden or steel; prefabricated or custom built. Below the rough-in box the space can be utilized by shelves or drawers to increase storage and to keep cooking equipment handy. Separate oven can be installed in combination with the minimum sized cooking top or larger model, and it can be in-

stalled at any height to eliminate stooping and low level lifting. Front of oven measures 20 inches wide by 24 inches high and fits into any standard sized cabinet 24 inches deep. Approved by UL. Thermador Electrical Manufacturing Co., Inc., 5119 District Blvd., Los Angeles 22, Calif.

Indicator and Control

A new smoke density indicator and control has been announced. Designed specially to indicate industrial smoke density levels, equipment can also be used to control over-the-fire heated air to the fire-box to reduce excessive smoke. Equipment consists of a light source, a phototube holder, and an enclosure containing the required control and incorporating an indicator calibrated in Ringlemann units. If desired, a recorder, either of the continuous strip chart type or the circular "step" type, can be furnished. Watertight phototube holder is mounted on ductwork or on a stack, indoors or outdoors. General Electric Company, Schenectady 5, N. Y.



Heating Elements

An engineering service to meet the many problems of spot heating encountered in industries such as the electrical appliance, plastic, chemical,

SAVE $7.20 ON EVERY HOUSE, MR. CONTRACTOR!

with the

PAIGE #52 CONNECTOR

For Non-Metallic Sheathed Cable

- EASY TO INSTALL
- TAKES ONLY 7 SECONDS
- NO SPECIAL TOOLS NEEDED
- Holds Cable In Place Without Screws Or Lock Nuts . . . For Strain Relief, Too.

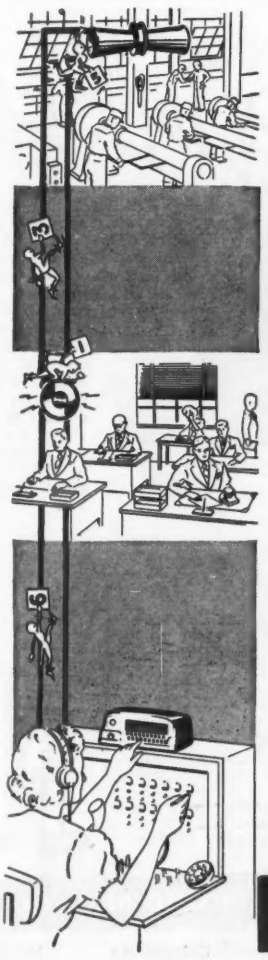
Figure it out for yourself, Mr. Electrical Contractor. In wiring the average 5-room house today, you will use 80 connectors. By using the new PAIGE #52 CONNECTOR, you save $7.20 in labor and materials!

For a lot of jobs, that saving really adds up. And it's one more spot where you can cut costs and labor time, something to consider in the ever-tightening construction field. Approved by Underwriters' Laboratories.

Ask your local jobber or write

Allied 1 N. LaSalle St., Dept. A Chicago 2, Ill.

ELECTRICAL MANUFACTURING CORP.



NEW Wheelock CODE CALL FOR INSTANT COMMUNICATION

Code call is made by a numerical code, sounding signals.

Promptly completes telephone connections with organization personnel away from their own telephones.

Eliminates time waste of telephone operator and other employees in "man-finding."

Enables employees without telephones to answer nearest telephone.

Write for New Bulletin B4-3.

SIGNAL ENGINEERING and MANUFACTURING COMPANY

154 WEST 14th ST. • NEW YORK 11, N. Y.

Write for NEW CATALOG

Now ready—
the new catalog showing every conduit fitting, coupling and accessory in the Kondu line.

KONDU Fittings

KONDU CORPORATION
ERIE • PENNSYLVANIA

Wide Variety

The most complete line of threadless fittings ever presented.

THREADLESS and THREADED

The Threaded Kondu fittings have covers and other accessories interchangeable with the Threadless line.

ALUMINUM ALLOY

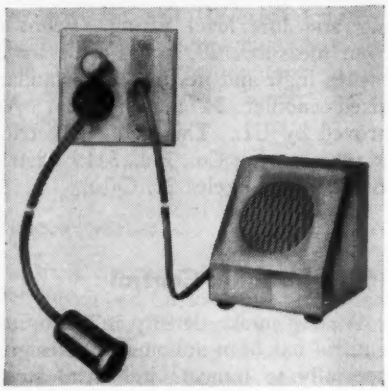
used exclusively—2/3 less weight, with no sacrifice of strength. And they are practically corrosion-proof. Write for new catalog, showing complete Kondu line of conduit fittings and accessories.

KONDU CORPORATION, Erie, Penna.

KONDU
The Threadless Fitting Line of Unequalled Variety

KONDU MFG. CO., LTD., Preston, Ontario

printing, etc., has been announced. Where recommended, heating elements in castings of special design in aluminum, bronze, gray iron, meehanite, etc. of wattage and voltage specified can be furnished. Examples of this service are (1) A unit to be cast into an aluminum scraper for quick defrosting of deep freeze units. (2) A unit ready for casting in a bronze branding iron. (3) An element used on a plastic moulding machine heating cylinder where more heat is required. (4) An element in a portable steam vaporizer used in hospitals, tailor shops, etc. Thermel, Inc., 4501 West Lake Street, Chicago 24, Ill.



Patient's Call Station

A new patient's low voltage type calling station has been developed. The locking button is enclosed in a high-impact, shock-resistant molded shell. The button is long and reset collar is large in area for resetting. All contacts are heavy duty with positive wiping action. Contact mechanism is positive-lock construction. Cord is connected by screw terminals and a strain relief anchor. Plug has a shock-resistant molded bakelite housing with five ball contacts. Receptacle has recessed contacts to receive the ball contacts of plug. Receptacle includes an automatic circuit-closer which automatically closes the same circuits and operates the same signals operated by the locking button, whenever plug is removed from receptacle. Auth Electric Company, Inc., 34-20 Forty Fifth St., Long Island City 1, N. Y.

Electric Saw

The addition of a new all-purpose, six inch saw has been added to this line of Guild tools. It is recommended for general carpentry, building and contracting, maintenance, repair, etc. Guild A-6 has a 6¼ inch diameter blade with a ⅝ inch standard round hole. It has a depth adjustment that

ADVERTISEMENT

IRVIN ANDERSON, Manager of Anderson Electric Company, Danville, Illinois, is another leading contractor who is finding it profitable to install Herman Nelson Propeller Fans. Like hundreds of other contractors, Mr. Anderson believes in selling quality products both for greater profits and for greater customer satisfaction. Herman Nelson Propeller Fans have proved to be outstanding in providing comfort and health in industrial, commercial and institutional buildings all over America. If you are interested in making more profitable sales in the huge industrial, commercial and institutional markets, write for the booklet, "1001 Ventilating Problems Solved."

Herman Nelson Propeller Fans

THE HERMAN NELSON CORPORATION
MOLINE, ILLINOIS

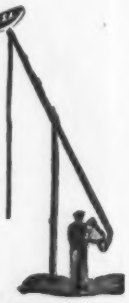
Water Tight!

REVERE Enclosed floodlights are subjected to a "rain test" to make sure that they are absolutely weather-proof. Lens is mounted in a ring which is hinged to reflector and is also held in place by 5 spring latches against a waterproof gasket.

Revere
ELECTRIC MFG. CO. CHICAGO, U.S.A.

FLOODLIGHTS
and Lighting Equipment

For Service Stations, Sports, Airports, Marine and Industrial purposes are easy to wire, install and maintain. You'll find that REVERE engineering and design meets every requirement BETTER.



REVERE ELECTRIC MFG. CO.
6017 Broadway Chicago 40, Illinois

can be regulated for any depth from $\frac{1}{8}$ of an inch to a full 2 inches. Designed for one hand operation, the saw has a trigger switch located on the handle for control and ease of operation. A turbine fan draws air through the motor and discharges it at the front, blowing the dust off the line of work. It is equipped with hardened steel helical gears. Saw operates on 115 volt, a-c/d-c. The Porter-Cable Machine Company, Syracuse 8, N. Y.

FHP Motors

A new line of unit bearing, shaded pole fhp. motors designed for use on portable equipment has been announced. Designated as the Type KSP71, they are available in these ratings: 1/40 hp., 60/50 cycle, totally enclosed; 1/25 hp., 60 cycle, totally enclosed; and 1/15 hp., 60 cycle, open. All ratings are available for 115 volts or 230 volts and for cw. or ccw. rotation. Suitable for use as drives for fans, blowers, and small pumps, the new motors have a die cast aluminum frame. Each rating can be used for horizontal or vertical shaft up operation and obtained with identical outline features. Models available in a variety of mountings, including shaft-end, opposite shaft-end, and resilient-base. General Electric Co., Schenectady 5, N. Y.

Service Body

A new all-purpose service body suitable for use in electrical contracting work, installation and maintenance of domestic and commercial refrigeration, air conditioning, motors, and fans, has been announced. Designated, the Service-Master, this unit provides facilities to carry a complete workshop to the job site. Weathertight compartments on either side of body are fitted with shelves, trays, and parts bins and may be individually locked. Shelves and bin partitions may be adjusted or removed. Ladder rack, pipe racks, heavy duty rear bumper and step, padded tie rails and inside tire carrier are offered

"JUST A SNAP" FOR BOTH AC AND DC

QUICK READINGS WITHOUT BREAKING CIRCUIT Instant current readings by merely placing the tongs around the electrical conductor—without breaking circuit or insulation. It's safe, convenient and accurate. Tong Test is the only ammeter of its type that can be used on both AC and DC. Cannot burn out for it has no windings. Interchangeable scale ranges up to 1000 amperes. Five types to accommodate cables up to 3 7/8", bus bars up to 4 1/2" x 1/2". Voltage readings, too, with the Voltor Attachment.

Write for Tong Test Bulletin CM-400

COLUMBIA ELECTRIC MFG. CO.
4541 Hamilton Ave., Cleveland 14, Ohio

Best Buy

FOR BIG USERS . . . the BIG 10-ROLL CAN of GOLD SEAL TAPE

● Packed for your convenience . . . 10 rolls of cellophane wrapped Gold Seal Tape in a handy 5 pound container. It's the best buy for regular users.

Whatever way you buy tape, you'll find Gold Seal always just right in "tack"; clean handling; non-raveling; non-peeling. Try it. Jenkins Bros. (Rubber Div.) 80 White St., New York 13.

Jenkins Bros. also make Diamond Seal Friction and Rubber Tapes which meet ASTM and Federal Specifications.

JENKINS Gold Seal Tapes FRICTION...RUBBER

MADE BY JENKINS BROS. . . . MAKERS OF FAMOUS JENKINS VALVES

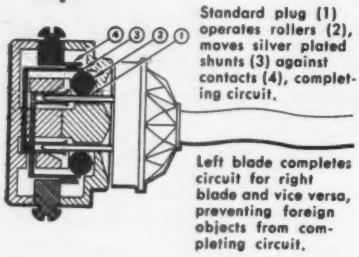
New SAFETY RECEPTACLE

MAKES CONTACT ONLY WHEN STANDARD CAP IS INSERTED

The *SAFETY-PLUS Receptacle

Actual tests prove it to be Safest Receptacle ever designed

- **Makes contact *ONLY* when standard cap is inserted**
- **Conventional operation . . . double contact springs**
- **Back or side wired—shallower for more wire room**
- **Takes polarized or standard caps**


Standard plug (1) operates rollers (2), moves silver plated shunts (3) against contacts (4), completing circuit.
Left blade completes circuit for right blade and vice versa, preventing foreign objects from completing circuit.

Featuring an entirely new principle, the Hubbell SP-49 Receptacle was designed to reduce the possibility of accidental shock and burn, makes contact ONLY when standard caps are inserted! Pins, wires or other foreign objects cannot energize the unit! The SP-49 provides easier wiring, more wire room, back wiring, washer ears, silver plated contact springs, interlocking bridge and takes standard caps.

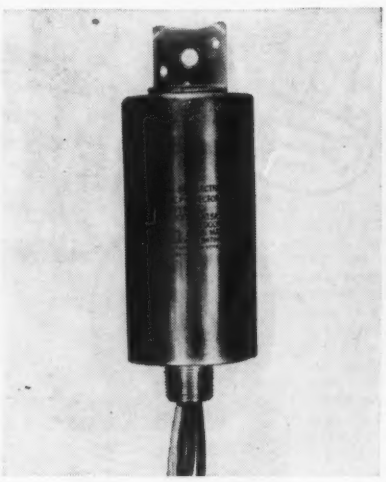
For descriptive literature write

HARVEY HUBBELL, INC.
Dept. E-1 Bridgeport 1, Conn.

as optional equipment. It is 48½ inches wide inside and available for mounting on ½ ton, ¾ ton and 1 ton chassis. Commercial Body Division, McCabe-Powers Auto Body Co., 5900 N. Broadway, St. Louis 15, Mo.

Die Head

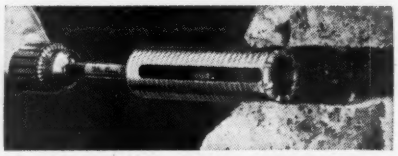
A new quick-opening die head to speed thread cutting on different pipe machines has been announced. It features monotype high speed steel chasers and can be used on any pipe threading machine having capacity to 2 inch pipe diameter. Suitable adaptors are furnished with die heads so they may be mounted either vertically or horizontally on machine carriage. Series of die heads designed for vertical mounting are interchangeable on individual machines. Sets designed for horizontal mounting are also interchangeable. Chasers are easily reground and reset. A separate set of chasers is required for each thread pitch and each diameter pipe. Single chasers are replaceable should they be broken or worn. Peerless Machine Co., 1600 Junction Avenue, Racine, Wis.



Lightning Protector

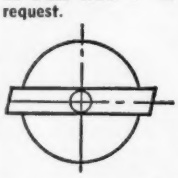
A new Thyrite lightning protector for meters, industrial power service entrances, or consumer apparatus, has been announced. Rated at 0-650 volts, the unit is available for either indoor or outdoor installation on single or polyphase secondary circuits. Single, double or triple-pole assemblies are enclosed in cylindrical aluminum cases, with provision for either nipple mounting through knockout holes of meters, or connection boxes, or bracket mounting to building or pole. Flamenol line and ground leads extend 18 inches outside threaded nipple. Weatherproof

DRILL CONCRETE
2 to 6 inches per minute



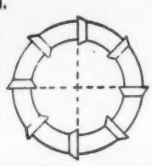
WITH THE REVOLUTIONARY TILDEN ROTARY CONCRETE CORE DRILL BIT, driven by ordinary electric drill

Up to 70% more efficient than pointed or solid drills. Leaves straighter, cleaner holes. Tilden Rotary Concrete Drill Bits are available in sizes from ¼" to 4" diameter. Quotations on sizes from 4" to 8" will be made upon request.



Ordinary pointed or solid drill (left) must drill FULL area of hole. Point of drill acts as pivot and retards cutting. Only one double cutter gives slow action. Slow-moving ⅛" center travels at only 13% of most efficient cutting speed.

TILDEN CORE TYPE DRILL (right) drills much smaller area of hole. Has no point to retard cutting. All drills have from 3 to 24 cutters, depending on size of drill, which travel at best cutting speed, give fast, efficient action.



Write for catalog with complete details on this revolutionary concrete drill bit. DISTRIBUTORS: Inquiries welcomed.

TILDEN TOOL MFG. CO.
1995 N. Fair Oaks, Pasadena 3, Calif.

ILSCO
Electrical Connectors

MANY TYPES AND SIZES
WRITE for 54-page illustrated catalog

ILSCO COPPER TUBE & PRODUCTS, Inc.
CINCINNATI, OHIO

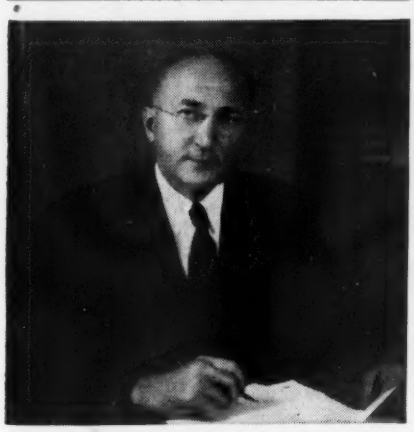
covering is colored for identification—black for the line leads and white for ground lead. Flamenol insulation is flame-proof. General Electric Company, Schenectady 5, N. Y.

New Equipment Briefs

Mitchell Manufacturing Company, Chicago, Ill. has announced two new room **air conditioners**, ¾ and ½ hp., for operation on 110-125 volts, 60 cycle a-c. . . . **Rotol** is a liquid formula for cleaning electrical contacts and is manufactured by the Rotol Chemical Corp., New York City. . . . Lovejoy Flexible Coupling Co., Chicago, Ill. has developed Dix precision-universal **joints** in 14 standard sizes.

A new complete line of **medicine cabinets**, called the Park Lane, has been introduced by Bennett Manufacturing Company. They are equipped with fluorescent lighting. . . . The Light Watchman, is an **emergency light unit** and will provide approximately ten hours emergency service with standard dry cell batteries. Can be used as a hand light. It is manufactured by Chatham Products Co., Newark, N. J. . . . The Vacombo **screw driver kit** has handle and five interchangeable shanks. It is recommended for home or shop use, and is available from Vaco Products Company, Chicago, Ill.

Signal Electric Manufacturing Company, Menominee, Mich., has added two new models to their line of Challenger **ventilating fans**. . . . Weldit, Inc., Detroit, has introduced a new series of



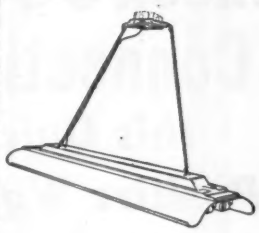
Axel H. Kahn is the new president of the Electric Association of Chicago. He is district manager of the General Electric Supply Corp., in Chicago and represents the wholesaler group on the Association Board of Directors. He began his career in the electrical wholesaling field in San Francisco; was operating manager of the San Francisco district of the G.E. Supply Corp. before becoming Chicago district manager in 1936. Other Association officers serving with Mr. Kahn are: Treasurer—G. L. Seaton, general manager, Illinois Bell Telephone Co.; Secretary—A. A. Gray.

How to Hang Chain Suspended Fixtures the Quick, Easy, Economical Way with HYDEE HANGER*

1. Connect wires to receptacle. Fits standard 4" or 3¼" outlet box or plaster ring. Only tool needed is a screwdriver.

2. Screw hanger to outlet box—only two screws needed. No centering, no punching, no drilling.

3. Hang the fixture and just plug it in. That's all! Self-grounding—regular 2-wire cord and plug may be used.



*Patent No. D-141024 and No. 440914 Underwriters approved. T. M. Reg. U. S. Pat. Off.

IT'S EASY TO SEE WHEN IT'S **DAY-BRITE** *Lighting*

Day-Brite Lighting, Inc., 5402 Bulwer Avenue, St. Louis 7, Missouri. Nationally distributed only through leading electrical wholesalers.
In Canada: address all inquiries to Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

HYDEE HANGER* REDUCES INSTALLATION TIME TO A FEW MINUTES

Complete with receptacle, two 5-foot chains, "S" hooks and clips. Nothing else to buy. List price, each $1.65

THE MAGNO-TRONIC FLUORESCENT STARTER

PROTECTS — Fully, automatic thermal relay with unusually long life that eliminates blinking lights and protects all auxiliary equipment.

SIMPLIFIES — Replacement of worn-out lamp automatically restores closed circuit—replacement of starter unnecessary. No button to push.

REDUCES COSTS — Magno-Tronic starters provide exact timing in the lamp electrode—preheating process preventing excessive loss of emission material, thereby assuring the maximum in the useful life of a lamp. The established quality of this starter saves considerable time in maintenance and man hours required to repair and/or replace an inoperative lighting unit.

VERSATILE — Will operate efficiently over an extended voltage range under widely varying temperatures.

GUARANTEED FOR ONE YEAR

The (SP-15-20) for use with either 15 or 20 watt lamps
The (SP 30-40) for use with either 30 or 40 watt lamps
The (SP 100) for use with 100 watt lamps

Ask for descriptive literature
INDUSTRIAL ELECTRONICS CORP.
MAIN PLANT Newark 2, N. J.

Check 3-Phase Connections *this Quick, Positive Way . . .*

KNOPP Phase Sequence Indicator *is* . . .

Reliable— Nothing to Adjust for Reading

Now you can save time in checking poly-phase connections and be sure they're RIGHT when you use the Knopp Phase Sequence Indicator.

Just clip it on, push the safety button and determine beyond a doubt whether the phase sequence is A-B-C; or C-B-A. This dependable Knopp Phase Sequence Indicator shows phase sequence by direction of disc rotation rather than by lamps. Gives correct indication regardless of voltage or circuit conditions without changing taps or dials. It does protect equipment and assures properly connected poly-phase wiring; 50 to 500 volts, 3 phase, 3 wire, 25-60 cycles.

Well-Built, Foolproof

It stands up under rough field use and gives accurate and reliable service. It is made by Electrical Facilities Inc., technical electric equipment manufacturers of 21 years experience. *This* indicator has a *laminated* bakelite housing and no exposed metal parts. It is built for *complete* safety. Fully insulated clips can remain attached between tests as safety push button permits indication only when needed. Weighing but 21 oz., the Knopp Phase Sequence Indicator is small and easy to carry. Price $25; with leather carrying case, $30. Order today or write for complete description.

ELECTRICAL FACILITIES INC.

4232 Holden Street Oakland 8, Calif.

torches designed to use atmospheric air and either propane or acetylene. . . . Thyco **plugs**, manufactured by Thyco Electrical Products Inc., Los Angeles, Calif., are equipped with finger grips preventing plugs from sticking.

General Electric's Lamp Department, Nela Park, has announced a new **miniature lamp**, designed NE-2. It consumes one-twenty-fifth of a watt of electric current. . . . A new electronic automatic speed **control unit**, known as the Varitronic drive, for machinery prime movers has been developed by Industrial Associates, Beverly Hills, Calif. . . . An improved tower for television receiving **antennas**, Model 200, has been announced by the Easy-Up Tower Company of Racine, Wis.

Single-button, maintained contact control with any Unimax a-c, a-c/d-c, or metal-cased snap-acting switch is provided by the new style "P" **adapta-plate**, manufactured by Unimax Switch Division of the W. L. Maxson Corp., New York City. . . . The sequence charge **control**, a new device which can be attached to G-E rectifier type truck battery chargers to double their working capacity, has been announced by the General Electric Company, Schenectady, N. Y. . . . Octagon **cable boxes** have been added to the line of electrical equipment manufactured by Keystone Mfg. Co., Center Line, Mich.

A new **range surface unit**, known as Pyroflex, has been developed by Cutler-Hammer, Inc., Milwaukee, Wis. . . . William Brand & Co., New York has announced a new Turbotherm REL-16A **insulated wire.** It carries 105 C rating, continuous operating for 300 and 600 volts. . . . Colonial Electric Products, Inc., East Paterson, N. J. has introduced a new "UHE 200" **lamp** for slimline or cold cathode fixture. It operates at 200 milliamps.

A dry chemical type **fire extinguisher** has been announced by American-La-France-Foamite Corp., Elmira, N. Y. The chemical is nontoxic, non-corrosive, nonconductor of electricity, and will not freeze. . . . Tenite **plastic spiral guards** for power lines are manufactured by Preformed Line Products Co., Cleveland, Ohio.

Donald Schuster, Dietz Electric Co. (right) demonstrates the Sterling Speed-Trol unit to electricians Ray Ushold and Pat Banaszak of Milprint, Inc., Milwaukee. Exhibit was at the Milwaukee EME Show.

MASONRY DRILLERS

- Get hole depth up 5 times as fast
- Use the drill that stays sharp up to 100 times longer
- Use Kennametal Masonry Drills

Get Results Like This:

"50 holes—1½ inches deep in tile, per grind. Speed—40 seconds per hole."

"Average 100 holes, 3½ inches deep in cement between re-grind. Speed—15 seconds per hole."

"Saved 7½ hours in one day with one bit. Go on new job tomorrow. Saved money—had easier going."

PLASTER, TILE, CEMENT, LIMESTONE, SLATE, BRICK, etc. are drilled at less cost, in less time, with less effort.

Hard, diamond-like Kennametal Masonry Drills pierce smooth surfaces, drill true, sharp edged holes. Blade action ejects the cuttings, prevents binding, sticking. Bits are ¼" to 1½" in diameter and can be used in drill presses, hand braces, rotary drills. Write for bulletin EK now.

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● Used and endorsed by electricians for 36 years. A few easy downward pulls on operating strap takes bits through toughest joist. Features new self centering chuck. Telescopic adjustment from 4½ feet to 13½ feet. Bores holes level. Uses standard square shank short bits—always available. One or two jobs pay for the unit.

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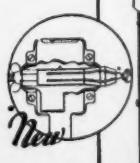
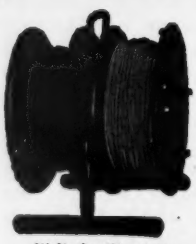


HyKon



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HYKON WIRE REELS

Available in 2 diameters for any size wire —in various multiples. Reels wire off top, bottom or from any angle—no kinking — correct tension maintained.

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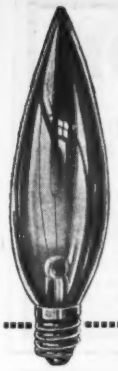

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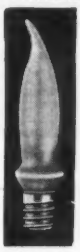

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Write for full information on accessories and other models, or see your supplier..

U-C LITE MFG. CO.
1035 West Hubbard Street
Chicago 22, Illinois

CEMENT PLANT ELECTRIFICATION [FROM PAGE 77]

with the wiring diagrams. This has been very helpful to the maintenance crew in running down cases of trouble in the control circuits.

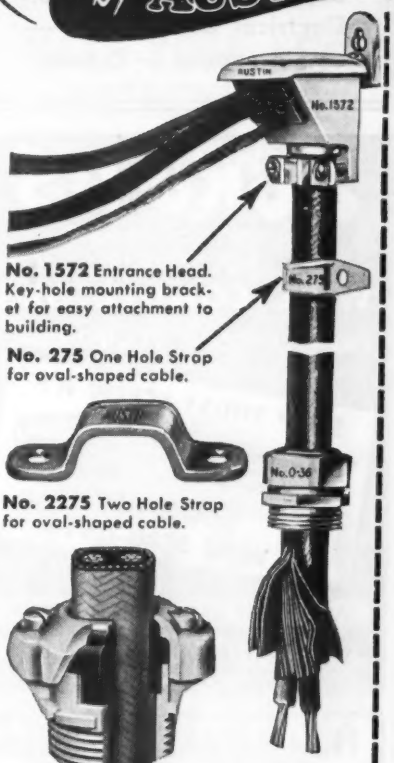
The equipment controlled from each panel is wired in such a manner that it can be started only in the proper sequence; i.e., the operator cannot put feed into a ball mill that is not running, etc. Under normal operating conditions the operator sets his selector switch for automatic control, presses a group start button, and the department starts up in proper order. To shut the circuit down he presses a group stop button which stops the entire section. Electrical interlocking will shut the entire circuit down if any part of it stops or fails to function properly. This prevents material pile-ups if a belt breaks, etc. Each drive has a start button installed at the motor which can be used if the automatic control becomes inoperative. When these individual buttons are used the operator must place his selector switch on hand control, and the interlocking is removed from the circuit. As a safety measure to protect the operating personnel, stop buttons were installed at each drive and certain strategic points. Any one of these buttons will shut the entire department down.

The complexity of these interlocked control circuit presents a real hazard to the maintenance force, and they must be constantly on guard against feedbacks in the wiring. However, in eight months of operation there has not been an electrical accident of any kind.

All of the motors in the Plant are three phase alternating current with the exception of two 1 hp. direct current motors used on the kiln feeders where a variable speed was necessary. In all other cases in which a variable speed was required, Reeves drives were used with the exception of the kilns and the kiln fans. Four speed consequent pole motors were used on these particular drives to secure the desired speed changes. These speed changes are made by means of push-buttons on the burning control panel. There are about 200 motors in the plant, ranging in size from ⅙ hp. control motors to the 1000 hp. ball mill motors.

The two raw mills are driven by 500 hp. 4160 volt synchronous motors; the two finish mills are driven by 1000 hp. 4160 volt synchronous motors. These motors are direct connected to

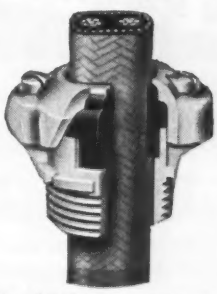
ENTRANCE CAPS AND FITTINGS of Rustproof Cast Aluminum Alloy by AUSTIN



No. 1572 Entrance Head. Key-hole mounting bracket for easy attachment to building.

No. 275 One Hole Strap for oval-shaped cable.

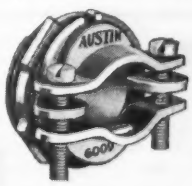
No. 2275 Two Hole Strap for oval-shaped cable.



No. SO-36 Watertight Connector. Cutaway view illustrates how 3-point compression forces rubber gland around entire circumference of cable.

No. GR-1 Grounding Ring. For bonding meter box to artificial ground. Tight connection and positive bond without soldering.

No. 6009 Non-watertight Connector. Takes a wide range of sizes and types of cable, round or oval, without the use of shims or inserts.



No. L-63 Sill Plate. Provides metallic protection to service entrance cable at the most hazardous point—where it enters the building.

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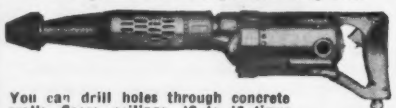
CASH FOR YOUR SURPLUS

How to drill Concrete

for expansion bolts, conduits, etc.



You can drill holes through concrete walls, floors, ceilings, 12 to 15 times faster than by hand. Use the Wodack Do-all Electric Hammer. Typical example: drills a ⅜" hole 1" deep through average concrete in less than 15 seconds! Saves time and money. You also use Wodack Do-all for chipping concrete, drilling wood, metal, etc. Investigate.

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2—100 KW 250 volt DC Generators. Steam driven by Ball Engines—140# pressure.
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The Where-to-Buy Section of Electrical Construction and Maintenance supplements other advertising in this issue with these additional announcements of products and materials of special interest and application in the field of electrical construction, maintenance and repair work. Make a habit of checking this page each issue—a *good* habit!

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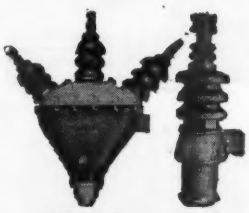

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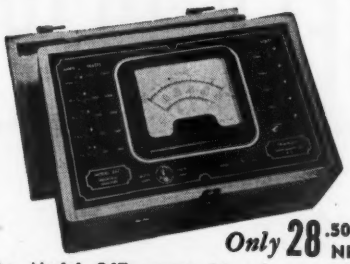

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  A.C. VOLTS 0 to 150/300/750 Volts
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the mills through flexible couplings and start directly across the line, using three point starting. The motor winding is broken up into three parallel circuits for starting purposes in order to reduce the starting current to a reasonable value. The starting of these motors throws a severe load on the primary power system, but no difficulty is experienced in getting them onto the line under normal conditions. The starters for these large motors are installed in the main substation building and are General Electric limit-amp. starters with current-limiting fuses for short circuit protection. All four of these motors are designed for an .80 leading power factor to provide correction for the induction motor load in the plant. The power factor at full load for the entire plant is about 100% which represents very careful planning on the part of the designers.

The control for these motors consists of air-break switches operated by 220 volt closing coils with the necessary auxiliary equipment. It includes automatic field removal if the motor falls out of synchronism for any reason with reapplication of the field when the motor reaches pull-in speed again. Overload heater protection is provided for both the rotor and the stator windings. If the motor runs for too long a period without synchronizing the rotor, overload will remove it from the line to prevent damage to the rotor winding from heating. This is an important feature since the rotor winding will reach a dangerous temperature under such a condition long before the stator winding does.

There are four limit-amp. starters in the main substation building along with four motor generator sets to provide field excitation for the four mill motors. Each motor has an individual exciter, although the exciters are large enough to handle two motors in case of emergency. The limit-amp. starters are fed directly from the 4160 volt bus in the main substation.

A unit substation in the main substation supplies 4160 volt power to the limit-amp. starters and the unit substations in the plant. The substation receives its power from two transformer banks located in the switchyard outside the main substation building.

These two transformers are energized at 66,000 volts from the local utility company by means of a 30 mile single circuit wooden pole line. This line terminates in a Westinghouse GO-3B oil switch rated at 600 amperes and 69,000 volts. The utility company has installed carrier current control to give

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INDUSTRIAL
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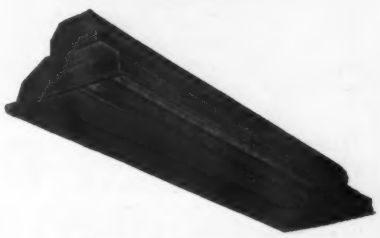

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ELIMINATES FATIGUE!
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Capacity 3" x 3". Saws in horizontal, vertical and up side down position. Cuts square and true any metal from tough solid steel to thin wall tubing. Simply put your work in the HAND-I-HACK swivel vice . . . clamp tight . . . set blade . . . start motor. HAND-I-HACK does the rest. Shuts off automatically when cut is finished.

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808 Emerson St. Syracuse, N. Y.

20 cycle reclosure on this breaker, thereby protecting the cement company against unnecessary outages and power failures. The oil switch feeds a 66 kv. bus in a switchyard. Two 3 phase air-cooled oil insulated transformers are connected to this bus through current limiting fuses and air-break switches. These two transformers are rated at 5000 kva. each with a voltage transformation of 66,000 to 4160 volts.

Power from the low voltage side of each transformer is fed to the unit substation inside the main substation building by means of a metal-enclosed copper bus. Each feeder ties into a 1200 ampere air switch of 17,500 ampere interrupting capacity. A similar breaker serves as a bus tie breaker to make it possible to operate with the bus either split into two sections or tied together. The station is so designed that one transformer will handle the present load with the other a spare.

Four 600 ampere circuit breakers are provided in the substation to control the feeders to the various unit substations in the plant. These 4160 volt feeders are varnished cambric lead-covered wires run in transite conduits in the building floor. A disconnect switch is installed at the transformer to isolate the feeder if necessary.

The air circuit breakers in the unit substation are withdrawal type breakers operated from a control battery in the main substation. The unit has the necessary relays and auxiliary equipment to protect it against faults in the plant system or the incoming line to the plant. Watthour meters are installed on all of the feeders, and a complete record is kept of power consumption in the different departments.

Three types of lighting were used in the plant: (1) high intensity mercury vapor for the high bay mill areas, (2) incandescent for general and supplementary lighting, and (3) fluorescent in the main substation building. Each unit substation contains a bank of three single phase dry type lighting transformers and a distribution cabinet for that area. The transformers are connected delta-wye to provide 120/208 volts to the lighting cabinets.

All of the wiring in the plant is enclosed in either rigid or flexible metallic conduit. The electrical department is following a preventive maintenance program that is calculated to minimize electrical delays and failures.

The nature of the plant is such that there is considerable dust present, but all departments cooperate to keep the equipment as clean as possible. Otherwise the cleanup program would soon get entirely out of hand.

K&H Solderless Terminal LUGS — A SIZE and TYPE for every need! — K&H Solderless CONNECTORS

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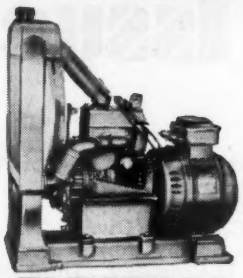
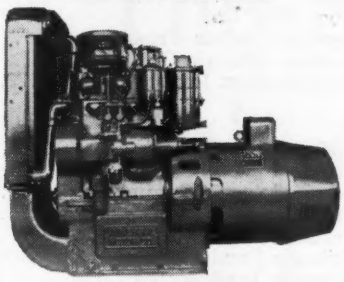


ELECTRIC



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VAN HALST CALCULATOR

BOX 317

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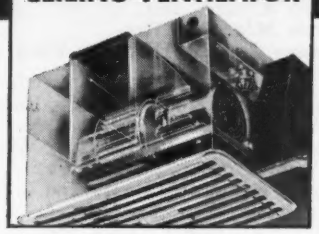
Only **TRADE-WIND** MAKES THE

CLIPPER CEILING VENTILATOR



. . . better 5 ways because—

1. Mounts in ceiling directly above stove—instantly catches heat, grease and odors as they rise.
2. Only an inconspicuous "dripless" ceiling grille is visible, yet unit easily installed.
3. Powerful squirrel-cage blower (not a fan!) creates fast-moving stream of air to do job efficiently.
4. Because of patented construction which isolates motor from greasy air stream, unit guaranteed 5 years.
5. Available everywhere. Stocked by dealers coast to coast.

Send coupon or write for the Clipper Dealer Plan.

Trade-Wind Motorfans, Inc.
5709 S. Main St., Los Angeles 37, Calif.

Name_____

Address_____

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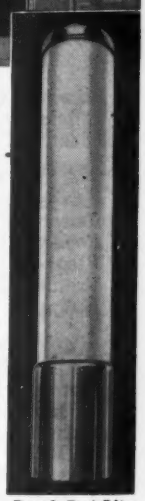
The big development in outside business lighting is to the "new method of lighting" made possible by Post-Lites, the new all-weather fluorescents. These dramatic, stream-lined lights radiate light in all directions. They completely dominate any surroundings. Visible a mile away. Attract business like nothing else can. One installation sells others. This is your big opportunity!

Post-Lites are well engineered by a 38 year old company. Good in zero weather. Wide variety of types install on posts, walls, corners. Mail coupon for new Catalog.



Round Post-Lites straddle pipe posts. Half-round Post-Lites mount on walls. Also other models

W. H. LONG CO., 61 W. Hubbard St., Chicago 10.

Please mail Catalog and Prices.

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Address .....

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"Give us the tools . . ."

The 81st Congress Can Halt the Administration's *SOCIALIST PROGRAM*

In his speech at Massachusetts Institute of Technology, Winston Churchill said that America's possession of the atomic bomb is all that has kept Soviet Russia from overrunning Europe and bombing London.

Our State Department knows that there has been another deterrent to aggressive warfare by Russia and a deciding one. That deterrent is the superior industrial strength of the United States. But once Russia approaches our industrial strength, then watch out! For Stalin or no Stalin, there will be trouble. Therefore, the simple table below is worth every American's careful reading. It shows in percentages what Russia did with her national income in 1948 and what we did with ours:

	USSR	USA
Civilian use	60%	79%
New capital equipment and public works	21%	12%
Foreign aid		2%
Defense	13%	5%
Building of inventories and war stock-piling	6%	2%

These figures for Russia come from *The* (London) *Economist,* Britain's influential economic journal.

These figures are estimates based on information from behind the Iron Curtain, and so cannot be checked directly. But they fit with what is known of Russian development.

The table shows that Russia is straining every resource to build up its industrial strength. When Russia's effort is measured in *dollars,* and compared to ours, the figures show:

Where we spent $20 to $21 billion for new industrial plants and equipment last year, the Russians spent $12 to $14 billion.

But while we used about $9 billion of this to *replace* old equipment, the Russians spent no more than $2 billion for replacing old equipment. The Russians had much less worn-out and obsolete equipment to replace. They could concentrate their efforts on expanding their industries and buying new equipment.

So—we used only $11 to $12 billion to *expand* our industries.

And the Russians used almost as much to expand theirs—$10 to $12 billion.

Russia is gaining industrial strength as fast as we are—and may soon be gaining faster. The more she gains and the faster she gains on us, the greater is the danger of war.

continued on next page

American industry is pushing modernization and expansion hard. It is doing an heroic job. McGraw-Hill's recent survey* shows that *industry* already has in hand plans to build plants and buy equipment in the next five years adding up to $55 billion. Industry plans that investment—*and much more—if it can get the money.*

On those plans of *industry* depend *our* national security.

If these plans of ours are cut back, the Russians will be years closer to their goal of industrial equality—the strength that they need to wage aggressive war successfully.

But more and more our industry's plans are being menaced by socialist policies in Washington. The President continues to urge a further increase in the tax on corporate profits, even though federal taxes alone now take 38 cents of every dollar of profit. He wants $3 billion more in taxes on corporate profits now, plus added personal taxes.

Last year corporations spent almost two-thirds of their profits—about $13 billion—for new plant and equipment. This year corporation profits will be lower than last year's $21 billion, perhaps by 20 per cent. Subtract a fifth or more from last year's profits. Then adopt the President's proposal and take $3 billion more in corporate taxes and you raise havoc with planned expenditures for new plant and equipment.

Approval by Congress of the President's tax program would cut industry's program of plant and equipment development by a third or more. That means a major blow to our prosperity as well as our national security. For as capital investment goes, so goes general prosperity.

Further serious damage would be done by Congressional approval of the President's industry-control bill. The so-called Stability Act of 1949 (the Spence Bill) would severely check industrial progress. That bill would put the federal government in the business of providing the added industrial capacity which the tax program would prevent private industry from doing for itself. It would be hard to conceive a better and surer way to dry up private investment in new plant and equipment. For every dollar of government investment will scare away many times more dollars of private investment. People will not want to risk their money in businesses competing with the U. S. Treasury. At the same time it will attack private investment in another way. It means that government would spend your income for you instead of allowing you to spend or invest for yourself. That is the high and quick road to socialism.

American industry needs right now great courage and incentives if it is to carry out its tremendous building program. It needs also a release from the program of a socialist administration in Washington with its systematic discouragement of enterprise and risk taking.

Above all, industry needs assurance by the actions of the 81st Congress itself that there is a future in this country for a system of dynamic capitalism, functioning in a free society. By acting now to strengthen the American people's faith in their industrial system, by providing needed incentives for management and investors, by protecting industry's capacity to buy new equipment, the 81st Congress can sustain American industrial progress and keep us united and strong.

But if we kill freedom of industrial planning and action by unneeded taxes and government controls we put ourselves—and our friends all over the world—in dire peril.

Nothing would please the Communists more.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

***A complete report on our national survey may be obtained by writing McGraw-Hill Publishing Co., 330 West 42nd St., New York 18, N. Y. This is one of a special series of editorials on industry's needs for new plants and equipment.**